

# LABORATORY PROCEDURES FOR:

LAMPS, REFLECTIVE DEVICES, AND ASSOCIATED

EQUIPMENT

FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 108

June 2, 1987

TP-108-12



**U.S. DEPARTMENT OF TRANSPORTATION**  
**National Highway Traffic Safety Administration**

ENFORCEMENT

OFFICE OF VEHICLE SAFETY COMPLIANCE

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SECTION A

GENERAL REQUIREMENTS

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OFFICE OF VEHICLE SAFETY COMPLIANCE TEST PROCEDURES

LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT

1. Purpose and Scope

The purpose of this procedure is to present a uniform testing and data recording format to the independent laboratories conducting tests to Federal Motor Vehicle Safety Standard (FMVSS) No. 108, "Lamps, Reflective Devices and Associated Equipment", for the Office of Vehicle Safety Compliance (OVSC), National Highway Traffic Safety Administration (NHTSA).

The test methods and procedure herein are based on the requirements of FMVSS No. 108. However, certain interpretations and clarifications have been made to standardize testing procedures among contracted laboratories and to provide for correlation of test results.

This procedure, prepared for use by independent laboratories under contract to conduct tests for the National Highway Traffic Safety Administration, is not intended to limit the requirements of the FMVSS. In some cases, the procedure does not include all of the FMVSS requirements. Sometimes, recognizing applicable test tolerances, the procedure specifies test conditions which are less severe than the requirements of the standard itself. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits his certification tests to those described in the test procedures.

Any contractor interpreting any part of this procedure to be in conflict with the actual standard or noting any deficiency in this procedure is required to advise the NHTSA Contract Technical Manager (CTM) prior to testing.

2. Equipment Marking, Security and Storage

Government supplied test items must be stored in a clean, dry and secure storage area to prevent deterioration of the samples in any manner which might affect test results.

All test items shall be inspected and inventoried within one week of receipt and copies of this inventory shall be forwarded to the OVSC within ten days of equipment arrival.

Each test item shall be identified and marked to prevent improper test sequencing. The marking shall be permanently affixed to each sample in a manner which does not affect test results.

### 3. Test Schedule

A weekly test summary including current test status, test started and completion dates, and a brief description of any failures must be mailed to the OSE on each Wednesday summarizing the previous week's activity. The following format will be used:

STATUS OF WORK ON FMVSS NO. 108 FOR  
NHTSA  
Date  
(CONTRACT NO. )

<u>TEST</u> <u>NO.</u>	<u>MAKE&amp;</u> <u>MODEL</u>	<u>SAE</u> <u>FUNC.</u>	<u>COMPS.</u> <u>AVAIL.</u>	<u>TEST</u> <u>STAND</u> <u>AVAIL.</u>	<u>TECH.</u> <u>INFOR.</u> <u>AVAIL.</u>	<u>TEST</u> <u>START</u>	<u>TEST</u> <u>COMP.</u>
---------------------------	----------------------------------	----------------------------	--------------------------------	--	--	-----------------------------	-----------------------------

#### REPORT

SUBMITTED      REMARKS (# FAILED, TYPE OF FAILURE, ETC.)

### 4. Test Procedure and Sequence

The test sequence for each type test shall be in the order given in the particular portion of Section "B" applicable to that item. These individual test portions are designed to allow a technician to perform tests on a particular item with minimal reference to FMVSS No. 108 and other standards referenced therein.

The format of the Test Data forms, contained in Section "C," are mandatory for use in documenting the inspection and test data observed or recorded during the performance of the test.

### 5. Interim Failure Reports

The Laboratory Monitor will be notified by telephone within 24 hours of the completion of any test phase resulting in a failure. Three copies of the data sheets pertaining to that phase and bulb calibration data will be mailed to the CTM within 2 working days of the completion of the test phase. These data sheets may be handwritten. Complete a copy of the "Notice of Failure to Meet Performance Requirements" (See the following page of this procedure) and submit the data sheets, attached to this notice.

NOTICE OF FAILURE TO MEET PERFORMANCE REQUIREMENTS

FMVSS No. 108

Identification of Lamp or Device

NHTSA Test No. \_\_\_\_\_

Manufacturer and Part Number \_\_\_\_\_

Vehicle Type/Manufacturer in Which Used \_\_\_\_\_

Performance Requirement (Specify the SAE standard or recommended practice, as listed in the tables incorporated in FMVSS No. 108) \_\_\_\_\_

Description of Apparent Noncompliance (Give a brief description in the space below and attach copies of test data sheets) \_\_\_\_\_

Additional Information Including Cause of Failure, as Available \_\_\_\_\_

\_\_\_\_\_  
Project Engineer

\_\_\_\_\_  
Laboratory Manager

\_\_\_\_\_  
Date

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## 6. Final Report

Within 3 weeks after completion of all phases of testing, one copy of the final report will be submitted to the Contracting Officer and nine copies to the CTM.

As a minimum, each final report shall contain the following items:

1. Compliance Test Summary.
2. Compliance Test Data Forms.
3. Compliance Status Data Collection Form.
4. Photographs of one sample in assembled and disassembled views for identification purposes and of failures when applicable.
5. Copies of continuously recorded data in each failure report or upon request.

Preparation of the Final Report and Standard Title page is outlined in Attachment 1. The report shall be typed and securely bound.

## 7. Calibration of Measurement and Test Equipment

Before starting the test program, the contractor shall implement and maintain a measurement and test equipment calibration system in accordance with established calibration practices. Guidelines for setting up and maintaining such systems are described in MIL-C-45662A, "Calibration System Requirements."

The calibration system shall be set up and maintained as follows:

a. Standards for calibrating the measuring and test equipment shall be stored and used under appropriate environmental conditions to assure their accuracy and stability.

b. All measuring instruments and standards shall be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals not exceeding 6 months. Records, showing the calibration traceability to the National Bureau of Standards, shall be maintained for all measuring and test equipment.

One or more of the following factors may dictate a less frequent interval for certain intermediate or primary standards:

- (1) calibration history
- (2) severity of use
- (3) frequency of use
- (4) equipment sensitivity
- (5) accuracy of required measurement
- (6) severity of environment

Generally, such sensitive, complex instruments have calibration intervals recommended by their manufacturers and concurred in by the NBS.

Each contractor shall prepare a calibration procedure and submit it for approval to the CTM. For each instrument a calibration frequency shall be shown. Each such frequency when in excess of 6 months shall be adequately justified by the contractor. The CTM will approve or disapprove such frequency prior to start of testing.

c. All measuring and test equipment and measuring standards shall be labeled with the following information:

- (1) Date of calibration.
- (2) Date of next scheduled calibration.
- (3) Name of the person who calibrated the equipment.

d. A written calibration procedure shall be provided by the contractor which includes as a minimum the following information for all measuring and test equipment:

- (1) Type of equipment, manufacturer, model number, etc.
- (2) Measurement range.
- (3) Accuracy.
- (4) Calibration interval.

(5) Type of standard used to calibrate the equipment.

(Calibration traceability of the standard must be evident.)

e. Records of calibrations for all measuring and test equipment shall be kept by the contractor in a manner which assures the maintenance of established calibration schedules. All such records shall be readily available for inspection when authorized by the NHTSA CTM. The calibration system will need the acceptance of the NHTSA CTM before testing commences.

f. In the event of an indicated failure to the performance requirements of the standard, a post-test calibration check of some critically sensitive test equipment and instrumentation may be required for verification of accuracy. The necessity for this calibration check will be at the CTM's discretion and will be performed without additional costs.

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## 8. Operating Test Procedure

Before starting the test program, the contractor shall provide a written operating test procedure which includes a step-by-step description of the test methodology used in the program. Where appropriate, the test procedure will include items such as checkoff lists and individual worksheets for each testing phase. The operating test procedure will need the acceptance of the NHTSA CTM before testing commences.

All operations performed by the contractor in compliance with this requirement will be subject to NHTSA verification at unscheduled intervals. Verification will include, but not be limited to, the following:

(a) Surveillance of calibration operation for conformance to the established system.

(b) Review of calibration results as necessary to assure accuracy of the system.

## 9. Definition of Terms

Definitions of test items nomenclature are found in the procedure for that particular item.

Other definitions are:

Flash	a cycle of activation and deactivation of a lamp by automatic means continuing until stopped either automatically or manually.
Right (and left)	Right (and left) as viewed looking in the direction of the emanating light beam.
Multiple Compartment Lamp	A Multiple Compartment Lamp has two or more separately lighted areas which are joined by one or more common parts such as a housing or lens.
Multiple Lamp	A Multiple Lamp has two or more lamps used in single design location to perform a single function.

10. Permanent Recording of Data

Test data shall be recorded on permanent strip charts, circular recording charts, or other acceptable printout media. Where permanent trace recording is not required, data will be recorded on standard report forms. Changes or corrections shall be made by drawing a line through the original entry, which must still remain legible, adding the change above or alongside, and initialed. The following tests will require permanent trace recordings.

<u>Test</u>	<u>Parameters</u>
1. Corrosion	Temperature vs time
2. Flasher	Temperature vs time
	Voltage vs time



SECTION B

DETAIL TEST

REQUIREMENTS



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## 1. SEALED BEAM HEADLAMP UNIT TEST PROCEDURE

### Definitions

Sealed Beam Unit - An integral and indivisible optical assembly with the name "Sealed Beam" molded in the lens.

Upper Beam - A clear road beam intended primarily for distant illumination and for use on the open highway when not meeting vehicles.

Lower Beam - An asymmetrical beam with the major portion of the beam to the right of the vehicle centerline so designed for use in congested areas and on highways when meeting or following other vehicles.

7-inch Type 2 Sealed Beam Unit - A sealed unit 7-inches in diameter providing an upper and lower beam.

5 3/4-inch Type 1 Sealed Beam Unit - A sealed unit 5 3/4-inches in diameter providing, in conjunction with a type 2 unit, an upper beam.

5 3/4-inch Type 2 Sealed Beam Unit - A sealed unit 5 3/4-inches in diameter providing a lower beam and, in conjunction with a type 1 unit, providing an upper beam.

Mechanically Aimable Sealed Beam Unit - A sealed unit having three pads on the external face of the lens pre-aimed during manufacture to form an aiming plane.

### Physical Inspection

Perform the test listed below on the headlamp unit and record the test data on the data sheet.

(a) Record the manufacturer's name and/or trade marks on the headlamp lens.

(b) Record the trade number and volage for the headlamp on the unit.

(c) \*Measure and record the limiting Dimension "A" shown in Figure 1.

(d) \*Place the headlamp unit on a flat measuring surface table such that the aiming pads are normal to the surface of the table. Find the geometric center of the lens, and measure the distance between the electrical contacts on the rear of the headlamps with respect to the intersection of the vertical and horizontal centerlines of the lens.

(e) \*Measure Dimension "B" of the mounting ring locating notches for the applicable type lamp shown in Figure 1.

\*Not applicable to rectangular headlamp units.

#### Rectangular Headlamp Units

Measure spacing of electrical contacts as in (d) above in accordance with Figure 2. Determine if locating lugs are in accordance with Figure 2.

#### Clarity of Hot Spot Definition

The geometrical center of the high intensity zone of the upper beam of the 5 3/4-inch Type 1 sealed beam unit, and the top and left edge of the high intensity zone of the low beam of the 7-inch Type 2 and 5 3/4-Type 2 sealed beam units should be deemed sufficiently defined for the purpose of service aiming, if they can be set by three experienced observers on a vertical screen at 25 feet within a maximum vertical deviation of  $\pm 0.2$  degree and within a maximum horizontal deviation of  $\pm 0.4$  degree between the aim of the three observers. The aim for each observer shall be taken as the average of three observations.

#### Visual Appraisal of Aim

Locate the aiming plane of the sealed beam unit parallel to a vertical screen at 25 feet with the centerline normal to the plane intersecting the H-V point on the screen. The visual appraisal of mechanically aimable units shall be deemed sufficiently accurate if the average aim of three experienced observers with a minimum of three observations each is within the following allowable tolerance.

#### 5 3/4-inch Type 1

The geometric center of the high intensity area of the beam shall be 2 inches below horizontal  $\pm 1 \frac{1}{2}$  inch, and straight ahead on vertical within  $\pm 4$  inches right and left.

### 5 3/4-inch Type 2 and 7-inch Type 2

The top of the high intensity area of the low beam shall be horizontal  $\pm 1 \frac{1}{4}$  inches and the left edge straight ahead at vertical to 4 inches right.

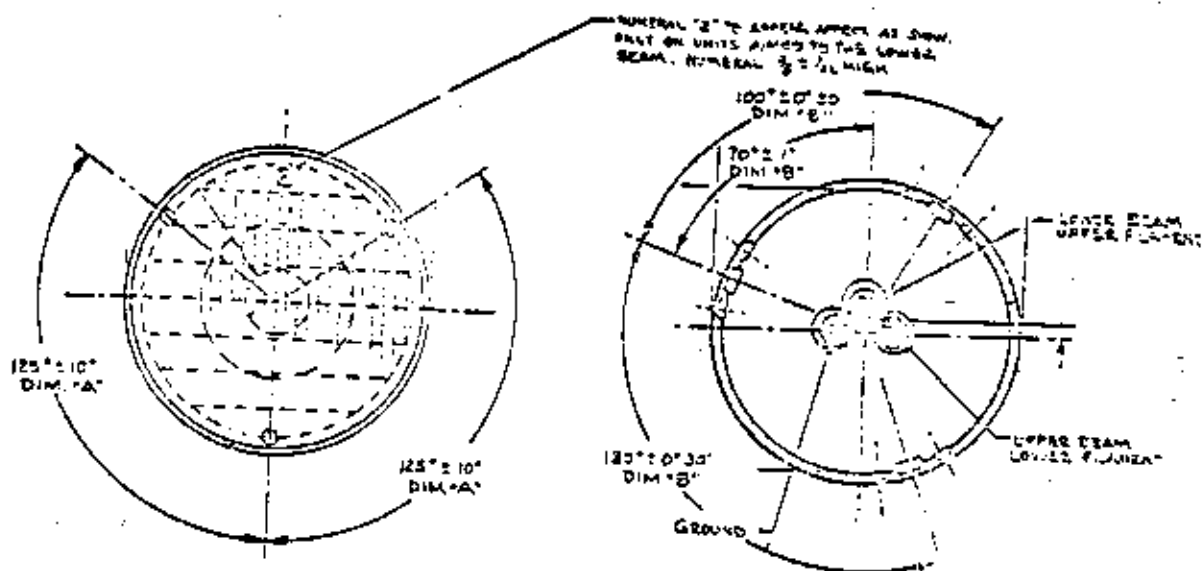
### Color Test

The sealed beam unit shall be tested for color in accordance with the general Color Test provided in Appendix G. The color of the sealed beam shall be white.

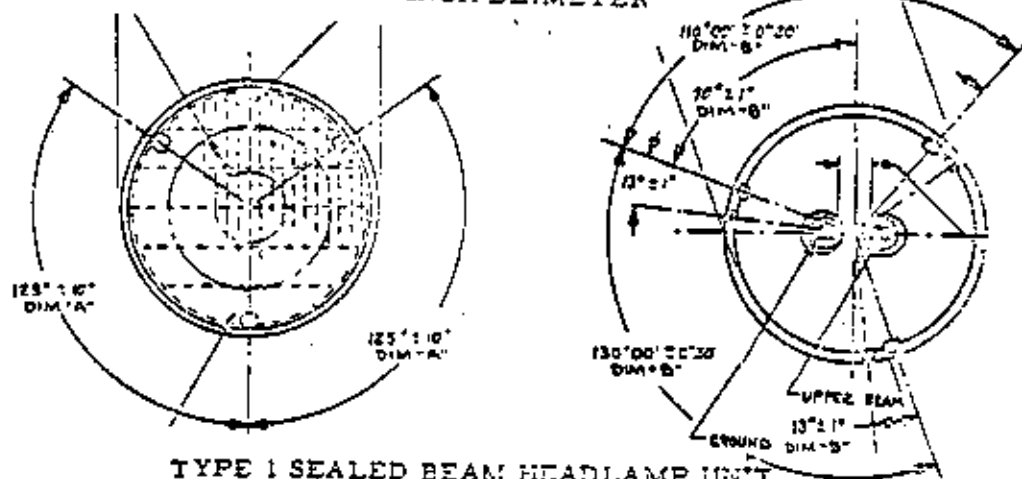
### Photometric Test

The photometric test shall be made in accordance with Appendix G at a distance of 60 feet from the lamp. The unit shall be operated at its design voltage during the tests. The sealed beam unit shall be aimed mechanically by centering the unit on the photometer axis and with the aiming plane through the faces of the pads on the lens normal to the photometer axis. The beam or beams from the unit shall meet the candlepower (cp) specifications listed in the following Tables I and II.

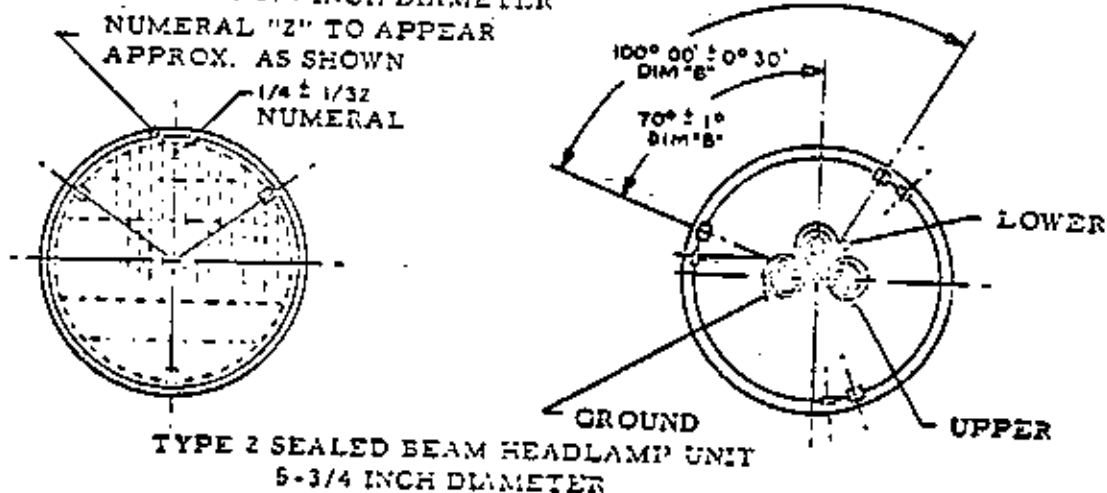
Findings shall be recorded on the appropriate data sheet.



SEALED BEAM HEADLAMP UNIT  
7 INCH DIAMETER



TYPE 1 SEALED BEAM HEADLAMP UNIT  
5 3/4 INCH DIAMETER



TYPE 2 SEALED BEAM HEADLAMP UNIT  
5-3/4 INCH DIAMETER

Figure 1





# SPECIFIED VALUES FOR 5-3/4-IN. SEALED BEAM UNITS

UPPER BEAM (ONE TYPE 1, AND ONE TYPE 2 UNIT)						LOWER BEAM (ONE TYPE 2 UNIT)		
Position, deg.	Type 1, No. 4001		Type 2, No. 4002		Position, deg.	Max cp	Min cp	
	Max cp	Min cp	Max cp	Min cp				
3U-3R and 3L 2U-3R and 3L 1U-3R and 3L 1/2D-V	a	450 750 3,000 18,000	300 750 2,000 7,000	1U-1L to left 1/2U-1L to left 1/2D-1L to left 1-1/2U-1R to right	500 800 2,000 1,000			
1/2D-3R and 3L 1/2D-6R and 6L 1/2D-9R and 9L 1/2D-12R and 12L		12,000 3,000 2,000 750	3,000 2,000 1,000 750	1/2U-1R to 3R 1/2D-2R 1D-6L 1-1/2D-2R	2,000 15,000	6,000 1,000 15,000		
2D-V 2D-9R and 9L 3D-V 3D-12R and 12L 4D-V		3,000 1,250 1,500 600	2,000 750 1,000 400	1-1/2D-9L and 9R 2D-15L and 15R 4D-4R 10U to 90U <sup>b</sup>	12,500 125	1,000 700		

<sup>a</sup> Combined maximum candlepower at 1/2D-V shall not exceed 37,500

<sup>b</sup> From the normally exposed surface of the lens

Table 1

SPECIFIED VALUES FOR 7-IN. TYPE 2 SEALED BEAM UNITS

UPPER BEAM (ONE 7-IN. UNIT)			LOWER BEAM (ONE 7-IN. UNIT)		
Position, deg	Max Cp	Min Cp	Position, deg	Max Cp	Min Cp
3U-3R and 3L		500	1U-1L to left	500	
2U-3R and 3L		1,000	1/2U-1L to left	800	
1U-3R and 3L		2,000	1/2D-1L to left	2,000	
1/2D-V		20,000	1-1/2U-1R to right	1,000	
1/2D-3R and 3L		10,000	1/2U-1R to 3R	2,000	
1/2D-6R and 6L		3,250	1/2D-2R	15,000	6,000
1/2D-9R and 9L		1,500	1D-6L		1,000
1/2D-12R and 12L		750	1-1/2D 2R		15,000
2D-V		5,000	1-1/2D-9L and 9R		1,000
2D-9R and 9L		1,500	2D-15L and 15R		700
3D-V		2,500	4D-4R	12,500	
3D-12R and 12L		750	10U to 90U*	125	
4D-V	5,000				
Maximum	37,500				

\*From the normally exposed surface of the lens

TABLE 11

## 1A. HALOGEN HEADLAMP UNIT TEST PROCEDURE

### Physical Inspection

Perform the test outlined below on the headlamp unit and record the results on the test data sheet:

- (a) Record the manufacturer's name and/or trade marks after examination of the lens and housing. Record the manufacturer's name and data from the bulb.
- (b) Record the trade number and voltage as shown on the unit.
- (c) Measure angle "E" for the mounting ring locating tabs for the pertinent mounting ring as shown on page 10 of the DOT procedure.
- (d) Determine whether the halogen bulb is removable versus the requirement in SAE J579a, under "Definitions," that the unit must be an integral and indivisible optical assembly.
- (e) Determine whether aiming pads are present versus the requirement in SAE J579a as stated in the paragraph entitled "Beam Aim During Photometric Test".
- (f) Determine whether the unit is sealed versus the requirement in SAE J579a under "Scope" that the unit be hermetically sealed.
- (g) Determine the wattage at 12.8 volts, as required by SAE J579a.

### Clarity of Spot Definition

Carry out this test as outlined on page 8 of the DOT test procedure and in SAE J579a.

### Color Test

The halogen unit shall be tested for color in accordance with the general Color Test provided in Appendix G. The color of the halogen beam shall be white.

### Photometric Test

7 inch R4 and 5 3/4 inch H4 Units - Low Beam: Carry out the aiming instructions as provided by the manufacturer. If none are provided, proceed as follows: Mount each unit in its fixture on the goniometer. Illuminate the unit at 12.8 volts. Using an aiming screen at 25 feet, line up the horizontal line

from the unit's beam pattern with the horizontal wire at 25 feet. Set the left edge of the high intensity area of the beam pattern straight ahead at vertical. Reset the goniometer to the positions of the unit as lined up on the aiming screen.

5 3/4 inch H1 Units - High Beam: Carry out the aiming instruction as provided by the manufacturer. If none are provided, proceed as follows: Mount the unit in its fixture on the goniometer. Illuminate the unit at 12.8 volts. Using an aiming screen at 25 feet, set the goniometer center of the high intensity area of the beam 2 inches below horizontal and straight ahead on vertical.

#### Photographs of the Beam Pattern as Aimed for Photometric Tests

For each of the different types of lamps built by each manufacturer, take one clear photograph of the beam pattern showing how it was lined up on the 25 foot aiming screen for photometric tests. Include these typical photographs in the test reports.

#### Photometric Measurements

The photometric test shall be made in accordance with Appendix G at a distance of 60 feet from the lamp. The unit shall be operated at 12.8 volts during the tests. The beam or beams of each unit shall meet the candela (cp) specifications listed in Tables I and II.

Findings shall be recorded on the appropriate data sheet.

1B. SEALED BEAM HEADLAMP UNIT TEST PROCEDURE - SAE J579c

Requirements

Carry out physical inspection and performance tests, as outlined in Part B1 of this procedure, using the photometric, aiming and other specifications as prescribed in SAE J579c of December 1974, except that:

(a) In Table 1 of SAE J579c, the maximum candela at any test point shall not exceed 37,500;

(b) In Table 2 of SAE J579c, the combined maximum candela at any test point shall not exceed 37,500; and

(c) At a voltage of 12.8 volts, the maximum design wattage, with an allowable tolerance of plus 7.5 percent, shall be as follows: 50 watts for Type 1 (5 3/4 inch); 37.5 watts for Type 2 (5 3/4 inch) high beam; and 60 watts for Type 2 (5 3/4 inch) low beam, Type 2 (7 inch) low beam and Type 2 (7 inch) high beam.

Also, note should be taken of coverage in paragraph S4.1.1.33 of FMVSS No. 108.

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## 1C. SEALED BEAM HEADLAMP UNIT TEST PROCEDURE - HIGH INTENSITY LAMPS

### Requirements

Carry out physical inspection and performance tests, as outlined in Part B1 of this procedure, using the photometric, aiming and other specifications as prescribed in SAE J579c of December 1974.

In addition, at a design voltage of 12.8 volts, the maximum design wattage for upper and lower beams on headlamps designed to conform to SAE J579c shall be as follows: 55 watts for upper beam on 100 X 165 mm rectangular headlamps and on 146 mm diameter headlamps, 43 watts for upper beam and 65 watts for lower beam on 100 X 165 mm rectangular headlamps and on 146 mm diameter headlamps, 70 watts for upper beam and 60 watts for lower beam on 142 X 200 mm rectangular headlamps, 65 watts for upper beam and 55 watts for lower beam on 178 mm diameter headlamps.

Also, note should be taken of coverage in the Federal Register, Vol. 43, No. 145 dated July 27, 1978.

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## 1D. SEALED BEAM HEADLAMP UNIT TEST PROCEDURE

### MOTORCYCLE HEADLAMPS

#### Requirements

Carry out physical inspection and performance tests, as outlined in the specifications of SAE J584 of April 1964.

Also, note should be taken of the option permitted in paragraph S4.1.1.34 in the Federal Register Vol. 43, No. 145 dated July 27, 1978.

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## 2. SEALED BEAM HEADLAMP TEST PROCEDURE

### Definitions

#### Sealed Beam Headlamp

A sealed beam headlamp including one or more sealed beam units is a major lighting device used to provide general illumination ahead of the vehicle.

#### Mounting Ring

The adjustable ring upon which the sealed beam unit is mounted in the headlamp.

#### Retaining Ring

The clamping ring that holds the sealed beam unit against the mounting ring.

### Physical Inspections

Perform the tests below and record the test data on the applicable data sheet.

(a) \*Verify Dimensions "B," and "C" of the mounting ring locating notches for the applicable type lamp shown in Figure 1.

For rectangular headlamps, verify position of locating notches.

(b) \*Inspect the sealed beam seating area, and verify that it is free from sharp burrs and other protrusions. Verify that the seating area extends at least  $1\frac{1}{4}$  inch to each side of the center of the locating lug notches.

(c) If gaskets are employed, evaluate the ease of inserting the headlamp into the headlamp housing employing gaskets.

(d) \*Insert a headlamp or a dummy flange with a flange thickness of  $0.465 \pm 0.005$  inch into the headlamp housing. Secure the retaining ring to the mounting ring. Shake the headlamp unit by hand, and record any indications of rattling or other noise.

(e) Determine number of turns of screw in loosening direction that are required for removal of retaining ring except for retaining ring requiring complete removal of screws. Record findings and use this number of turns to remove the retaining ring and reassemble the headlamp assembly 25 times. Tighten retaining ring screws to torque as specified by CTM. Upon completion, shake the headlamp assembly by hand, and record any indication that sealed beam unit is not securely held in position.

\*Does not apply to rectangular headlamps.

#### Connector Requirements

The voltage drop between any sealed beam contact and the connector at the end of a 3-inch wire lead from the socket shall not exceed 40 millivolts with a 10 amp load. A test setup as shown in Figure 2 should be used to determine voltage drop for the unit.

#### Aiming Adjustment Test

Determine limit of the adjustment in both vertical and horizontal planes.

The mechanism, including the aiming adjustment, must be designed as to prevent the unit from receding into the lamp body or housing when an inward force of 50 pounds is exerted on the outer surface of the lens. Position the headlamp unit in a holding fixture and exert a force of 45 to 50 pounds inward on the center of the lens. Determine if the lamp recedes into the housing.

The following requirements apply to headlamps with independent vertical and horizontal adjusting screws but not to lamps with ball and socket or equivalent adjustment means. Initially turn each adjustment screw counterclockwise 2 turns to loosen and unload the headlamp assembly prior to turning clockwise.

(a) The adjustment screws must be so positioned that neither the vertical nor horizontal aim will deviate more than 4 inches from the horizontal or vertical planes respectively, at a distance of 25 feet through an angle of plus or minus 4 degrees. Determine compliance by projecting lamp beam on a aiming board and adjusting through vertical and horizontal ranges.

(b) The self-locking devices used to hold aiming screws in position must continue to operate satisfactorily up to 10 adjustments on each screw, over a  $\frac{1}{4}$ -inch length of screw thread in and out without lubrication. Operate each adjusting screw through 10 cycles of adjustments and determine if operation is satisfactory.

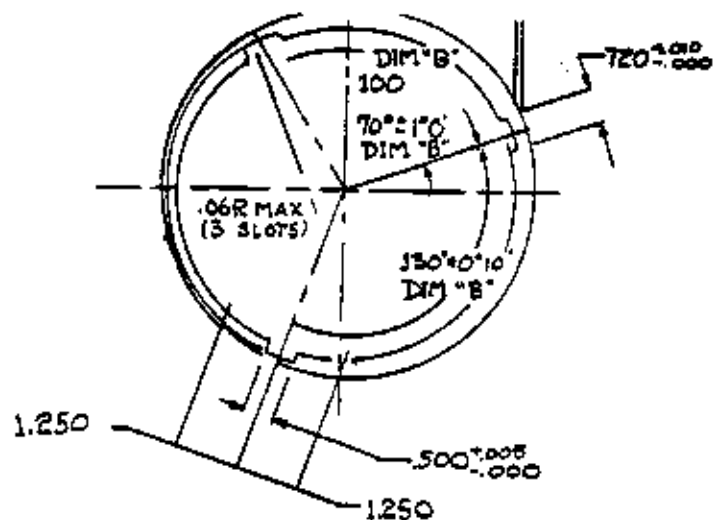
Results of these tests shall be recorded on the appropriate data sheet. If the requirements do not apply, so indicate.

#### Vibration Test

The device will be subjected to the vibration test as outlined in Appendix B. At the completion of the test, the device shall be examined for any evidence of material physical weakness or failure of parts which could affect functioning of the assembly. A failure of the sealed beam unit shall not be considered a test failure. Findings shall be recorded on the appropriate data sheet.

#### Corrosion Test

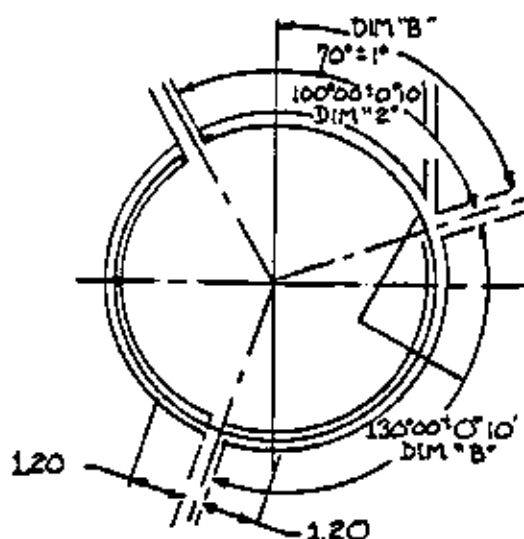
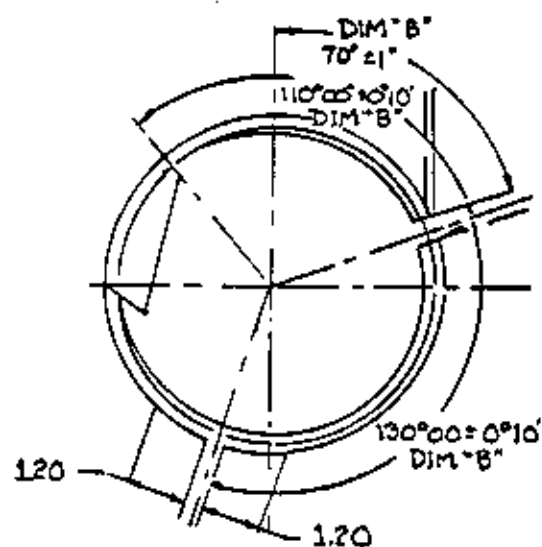
The sealed beam headlamp shall be subjected to a corrosion test as outlined in Appendix E. Any evidence of corrosion immediately after the test which affect the proper functioning of the devices shall be considered a failure. Findings shall be recorded on the appropriate data sheet.



FRONT VIEW OF SLOTS OR NOTCHES FOR 7 INCH  
DIAMETER SEALED BEAM HEADLAMP MOUNTING

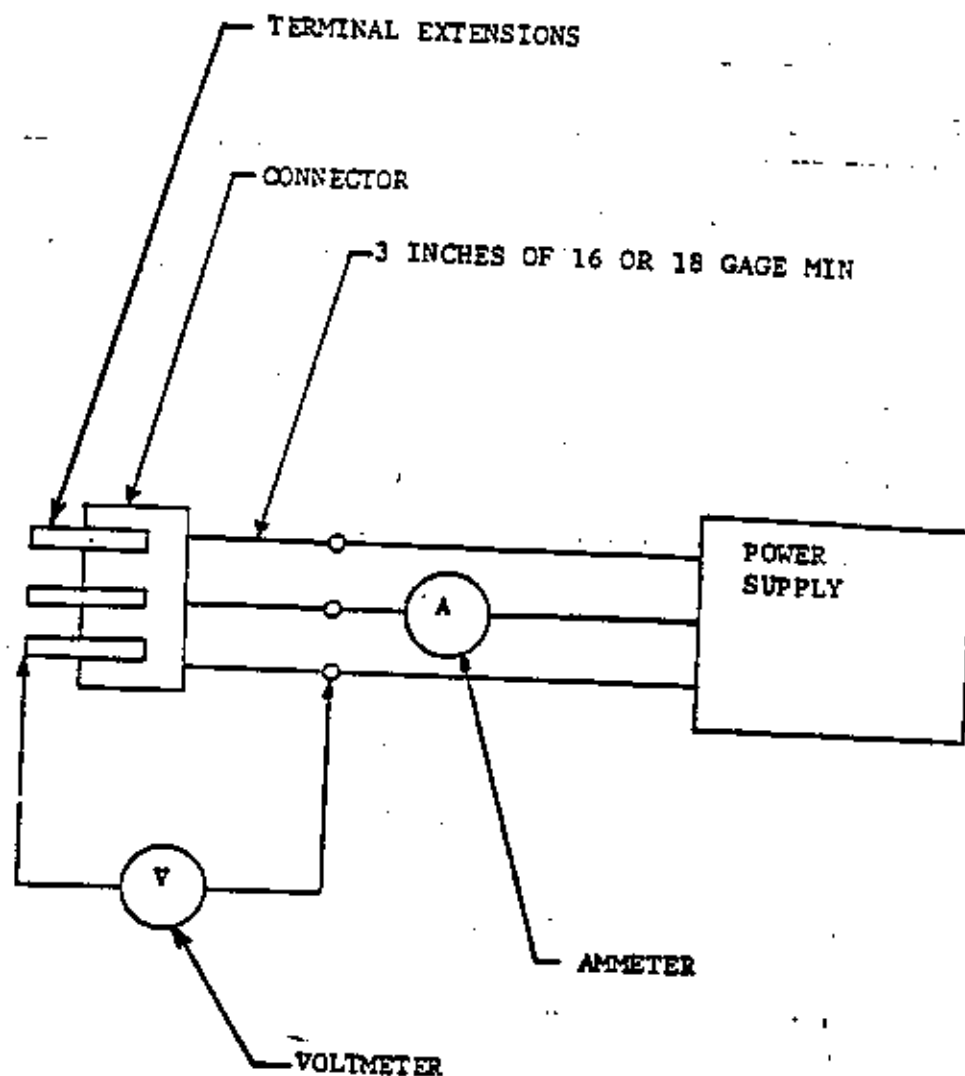
FOR TYPE 1 UNIT

FOR TYPE 2 UNIT



FRONT VIEW OF SLOTS OR NOTCHES FOR 5-3/4 INCH  
DIAMETER SEALED BEAM HEADLAMP MOUNTING RING

Figure 1



VOLTAGE DROP ACROSS HEADLAMP CONNECTOR

Figure 2

## 2a. REPLACEABLE BULB HEADLAMPS

### SUMMARY - PHASE I

Note: One lamp per test listed below shall be randomly selected, except that lamps can be used for more than one test when it is determined that the preceding test will have no detrimental effect on the following test. Substitutions of new samples will be made when an initial photometric test failure occurs on a given sample.

<u>Tests</u>	<u>FMVSS 108 Ref. Paragraph</u>	<u>FMVSS 108 Test Procedure</u>	<u>Results</u>		<u>Page Number</u>
			<u>Passed</u>	<u>Failed</u>	
Physical Description;					
Markings	S4.1.1.40				
Seasoning					
Photometric (Initial)	S4.1.1.36(b)(1)	S6.1			
Temperature Cycle	S4.1.1.36(d)(6a)	S6.7.1			
Internal Heat	S4.1.1.36(d)(6b)	S6.7.2			
Abrasion	S4.1.1.36(d)(1)	S6.2			
Corrosion	S4.1.1.36(d)(4)	S6.5			
Chemical Resistance	S4.1.1.36(d)(3)				
1. Gasoline		S6.4(b)(1)			
2. Tar Remover		S6.4(b)(2)			
3. Power Steering Fluid		S6.4(b)(3)			
4. Windshield Washer Fluid		S6.4(b)(4)			
5. Antifreeze		S6.4(b)(5)			
Photograph					
Dust	S4.1.1.36(d)(5)	S6.6			
Vibration	S4.1.1.36(d)(2)	S6.3			
Impact	S4.1.1.36(d)(8)	S6.9			
Humidity	S4.1.1.36(d)(7)	S6.8			
Pressure Test	S4.1.1.38(f)				
Aiming Adjustment	S4.1.1.36(b)(3)	SAE J580b			
Connector Requirements	S4.1.1.36(b)(3)	SAE J580b			
Inward Force	S4.1.1.36(b)(3)	SAE J580b			
Lumens-Wattage	S4.1.1.38 49 CFR Ch 5	Dated 10/1/86			
Dimensions	S4.1.1.38(b)(4)	-			
(Bulb and Lamp)					
Figure 3 Drawings					
Photographs - Phase I					
Accelerated Life Test	S4.1.2	SAE J576c*			

\*A flat specimen of the plastic material used for the lens shall be sent to an Arizona site for accelerated exposure equivalent to 3 year normal sun exposure.

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## SUMMARY - PHASE II

Note: Five additional samples should be tested for selected test protocols.  
Selection should be based on analysis of results of Phase I tests.

<u>Tests</u>	<u>FMVSS 108 Ref. Paragraph</u>	<u>FMVSS 108 Test Procedure</u>	<u>Results</u>		<u>Page Number</u>
			<u>Passed</u>	<u>Failed</u>	
Vibration	S4.1.1.36(d)(2)	S6.3			
Chemical Resistance					
Gasoline	S4.1.1.36(d)(3)	S6.4(b)(1)			
Photographs - Phase II					
Temperature Cycle	S4.1.1.36(d)(6a)	S6.7.1			
Internal Heat	S4.1.1.36(d)(6b)	S6.7.2			

### Photometric Tests

By reference to the sections of FMVSS No. 108 which are listed above for the abrasion, chemical resistance, dust, temperature cycle, internal heat and humidity tests, it will be noted that photometric tests are required after completion of each of these six tests.

In addition, photometric tests shall be run before each of these six tests, in order that the physical changes which occurred during the tests can be evaluated.

In all cases, photometric tests shall be based on SAE J579c 12/74, as specified in Tables I and III of FMVSS No. 108.



## PHYSICAL DESCRIPTION AND RELATED DATA

### Description

### Part Numbers

### Materials

### Dimensions (Overall)

### Markings - Certification

### Markings - Date Coding

### Seasoning

All lamps should be seasoned as described in S3 of FMVSS No. 108 for a period of time equal to 12 of average rated laboratory life prior to any testing. Major and minor filaments shall be seasoned independently.

## TESTS, TEST METHODS AND RESULTS OF TESTS

### TEMPERATURE CYCLE AND INTERNAL HEAT TESTS - PHASE I

#### I. Temperature Cycle - Lamp No.

##### TEST PROCEDURE - FMVSS 108 - 56.7.1

Expose the headlamp, mounted on a headlamp test fixture, to 10 complete consecutive thermal cycles having the thermal cycle profile allowable by FMVSS 108. During the hot cycle, energize the highest wattage filament at design voltage starting at point "A" of Fig. 6 and de-energized at point "B". All drain holes, breathing devices or other designed openings of the headlamp shall be in their normal operating positions.

##### TEST EVALUATION

Immediately after the test, the headlamp shall show no evidence of delamination, fractures, entry of moisture or deterioration of bonding material, color bleeding, warpage or deformation visible without magnification or lens warpage greater than 0.118 in. (3mm) when measured perpendicular to the aiming plane at the point of intersection of the mechanical axis with the exterior surface of the lens. The device shall be cleaned and then meet the photometric test requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles", December 1974.

##### TEST RESULTS (Test Data:

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## TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

### TEMPERATURE CYCLE AND INTERNAL HEAT TESTS - PHASE I

#### II. Internal Heat - Lamp No.

##### TEST PROCEDURE - FMVSS 108 - S6.7.2

After photometric tests have been completed as specified in S6.7.1, uniformly spray the lens surface that would normally be exposed to road dirt with any appropriate mixture of dust and water or other material to reduce the photometric output at the test point H-V of the lamp to  $25 \pm 2\%$  of the output measured before the lamp was sprayed with the appropriate mixture of dust and water. After the photometric output has been so reduced, mount the lamp in an environmental test chamber and soak for one hour at a temperature of  $95^{\circ}\text{F}$  ( $35^{\circ}\text{C}$ ) and then energize the highest wattage filament for one hour in a still air condition with the oven off, allowing the temperature to rise from  $95^{\circ}\text{F}$  ( $35^{\circ}\text{C}$ ). Return the lamp to the room ambient temperature,  $73 \pm 7^{\circ}\text{F}$  ( $23 \pm 4^{\circ}\text{C}$ ) and relative humidity of  $30 \pm 10\%$ . Clean the lens and photometer the headlamp to the photometric test requirements of SAE J579c.

##### TEST EVALUATION

Immediately after the test, there shall be no lens warpage greater than 0.118 in. (3mm) when measured perpendicular to the aiming plane at the point of intersection of the mechanical axis with the exterior surface of the lens. The device shall then meet the photometric test requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles", December 1974.

##### TEST RESULTS - (Test Date:

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## TESTS, TEST METHODS AND RESULTS OF TEST (cont'd)

### ABRASION TEST - PHASE I

#### TEST PROCEDURE - FMVSS 108 - S6.2 - Lamp No.

Mount the headlamp in an abrasion test fixture in the manner indicated in Figure 5 of FMVSS 108 with the lens facing upward. An abrading pad meeting the requirements listed below shall be cycled back and forth (1-cycle) for 11 cycles at  $4 \pm 0.8$  in. ( $10 \pm 2$  cm) per second over at least 80% of the lens surface, including all the area between the upper and lower aiming pads, but not including lens covers and edges.

1. The abrading pad shall be not less than  $1.0 \pm 0.04$  in. ( $2.5 \text{ cm} \pm 0.1 \text{ cm}$ ) wide, constructed of 0000 steel wool, rubber cemented to a rigid base shaped to the same vertical contour of the lens with the grain of the pad perpendicular to the direction of motion.
2. The abrading pad support shall be equal in size to the pad and the center of the support surface shall be within  $\pm 0.08$  in. ( $\pm 2 \text{ mm}$ ) parallel to the lens surface.
3. The density of the abrading pad shall be such that when the pad is mounted to its support and is resting unweighted on the lens, the base of the pad shall be no closer than  $0.125$  in. ( $3.2 \text{ mm}$ ) to the lens at its closest point.
4. When mounted on its support and resting on the lens of the test headlamp, the abrading pad shall then be weighted such that a pad pressure of  $2.0 \pm 0.15$  psi ( $14 \pm 1$  KPa) exists at the center and perpendicular to the face of the lens.

A pivot shall be used if it is required to follow the contour of the lens. Unused steel wool shall be used for each test.

#### TEST EVALUATION

Upon completion of the test, the device shall meet the photometric test requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles", December 1974.

#### TEST RESULTS - (Test Date:

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TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

CORROSION TEST - PHASE 1

TEST PROCEDURE - FMVSS 108 - S6.5 - Lamp No.

Place the headlamp, unfixtured and in its designed operating attitude with all drain holes, breaching devices or other designed openings in its normal operating position, in a salt spray (fog) test in accordance with ASTM B117-73, for a period of 240 hours, consisting of ten successive 24-hour intervals. During each interval, the headlamp shall be exposed for 23 hours to the salt spray, which shall not be activated for the 24th hour. Clean the headlamp and photometer it to SAE J579c.

TEST EVALUATION

There shall be no evidence of external or internal corrosion or rust visible without magnification. Loss of adhesion of any applied coating shall not occur more than 0.125 inch (3.2mm) from any sharp edge on the inside or outside. Corrosion may occur on the terminals provided there is no loss of function.

TEST RESULTS - (Test Date:

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TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

CHEMICAL RESISTANCE TEST - PHASE I

TEST PROCEDURE - FMVSS 108 - S6.4 - Lamp Nos.

Wipe the entire exterior lens surface of the headlamp and top surface of the lens-reflector joint, once to the left and once to the right, with a 6-inch square soft cotton cloth (with pressure equally applied) which has been saturated once in a container with two ounces of one of the following test fluids: 1. Gasoline, 2. Tar Remover, 3. Power Steering Fluid, 4. Windshield Washer Fluid, or 5. Antifreeze as specified in FMVSS 108. Wipe the lamp within 5 seconds after removal of the cloth from the test fluid. After wiping the headlamp with the test fluid, store it in designed operating attitude for 48 hours at a temperature of  $73^{\circ} \pm 7^{\circ}\text{F}$  ( $23^{\circ} \pm 4^{\circ}\text{C}$ ) and a relative humidity of  $30 \pm 10\%$ . At the end of the 48 hour period, wipe the headlamp and visually inspect it. Photometer the headlamp to the photometric test requirements of SAE J579c.

TEST EVALUATION

Upon completion of the test, there shall be no surface deterioration, coating delamination, fractures, deterioration of bonding materials, color bleeding or color pick-up visible without magnification. The device shall then meet the photometric test requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles", December 1974.

TEST RESULTS - (Test Date:

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TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

DUST TEST - PHASE I

TEST PROCEDURE - FMVSS 108 - S6.6 - Lamp No.

Place the headlamp, mounted on a test fixture, with all drain holes, breathing devices or other designed openings in their normal operating positions, in a cubical box, with inside measurements of 35.4 in. (900mm) on each side or larger a distance of at least 5.9 in. (150mm) between the headlamp and any wall of the box. The box shall contain 9.9 lbs. (4.5 kg) of fine powdered cement (ASTM C150-77). Every fifteen minutes, the cement shall be agitated by compressed air for a 2 second period in a downward direction. Continue the test for five hours after which wipe the exterior surfaces of the headlamp clean.

TEST EVALUATION

The device shall meet the photometric test requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles", December 1974.

TEST RESULTS - (Test Date:

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TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

VIBRATION TEST - PHASE I

TEST PROCEDURE - FMVSS 108 - S6.3 - Lamp No.

Vibrate the device for one hour in accordance with SAE J575a, "Tests for Motor Vehicle Lighting Devices and Components" August 1970. The adapter plate shall be of sufficient size to contain the test fixture base completely with no overhang. The direction of vibration shall be the vertical axis of the headlamp as mounted on the vehicle. Do not energize the filament.

TEST EVALUATION

The headlamp shall show no evidence of loose or broken parts visible without magnification, except that the filament need not be unbroken.

TEST RESULTS - (Test Date:

IMPACT TEST - PHASE I

TEST PROCEDURE - FMVSS 108 - S6.9 (Headlamp with plastic lens) - Lamp No.

Place the headlamp, rigidly mounted in a headlamp test fixture with the mechanical axis (bulb socket axis) vertical and the lens upward. The seating plane of the test fixture shall consist of oakwood 0.5 inch (13mm) thick. Drop a steel ball bearing with a diameter of 0.9055 in. (23mm) weighing 1.76 oz. (50 grams) from a distance of 15.75 in. (40cm) from the bottom of the ball to the surface of the center of the lens on the mechanical axis, at the intersection of the ball trajectory and the mechanical axis of the headlamp.

TEST EVALUATION

Upon completion of the test, there shall not be any fracture of the adhesion of lens coating or delamination of materials without magnification and the lens shall not be broken, cracked or chipped.

TEST RESULTS - (Test Date:

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TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

HUMIDITY TEST - PHASE I

TEST PROCEDURE - FMVSS 108 - S6.8 - Lamp No.

Place the headlamp, mounted on a test fixture, in a controlled environment consisting of a temperature of  $100^{\circ} \pm 9^{\circ}\text{F}$  ( $38^{\circ} \pm 5^{\circ}\text{C}$ ) with a relative humidity of  $90 \pm 10\%$ . All drain holes, breathing devices and other designed openings shall be in their normal operating positions. Subject the headlamp to 20 consecutive 6-hour test cycles. In each cycle, the headlamp is energized at design voltage on the highest wattage filament contained in the device for one hour and then de-energized for five hours. After completion of the last cycle, soak the headlamp for one hour at  $73^{\circ}\text{F}$  ( $20^{\circ}\text{C}$ ) and a relative humidity of  $30 \pm 10\%$  before it is removed for photometric testing. Photometer the headlamp at  $10 \pm 1$  minutes following completion of the humidity test.

TEST EVALUATION

Upon completion of the test, the inside of the headlamp shall show no evidence of delamination or moisture, fogging or condensation visible without magnification. The device shall then meet the photometric test requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles", December 1974.

TEST RESULTS - (Test Date:

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TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

AIMING ADJUSTMENT, CONNECTOR REQUIREMENT  
AND INWARD FORCE TESTS - SAE J580b

I. AIMING ADJUSTMENT TESTS - Lamp No.

1. A minimum aiming adjustment of  $\pm 4^\circ$  must be provided in both the vertical and the horizontal planes.
2. The headlamp unit mounting must be provided with independent vertical and horizontal aiming adjustments. The adjustment screws must be so positioned that neither the vertical nor horizontal aim will deviate more than 4.00 in. from the horizontal or vertical planes respectively, at a distance of 25 ft., through an angle of plus to minus  $4^\circ$ .

<u>Deviation (inches)</u>		
<u>Horizontal</u>	<u>Vertical</u>	<u>Specified Maximum</u>
		4.00

II. CONNECTOR REQUIREMENTS - Lamp No.

The voltage drop between any sealed beam contact and the end of 3-in. wire lead from the socket shall not exceed 40 millivolts with 10 amp. load.

The voltage drop between each sealed beam contact and the end of 3-in. wire lead from the socket was measured. The results follow:

<u>Millivolt Drop in Connector at 10 Amperes</u>			
<u>Measured</u>			<u>Specified</u>
<u>Upper Beam</u>	<u>Lower Beam</u>	<u>Ground</u>	<u>Maximum</u>

40

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TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

III. INWARD FORCE TEST - Lamp No.

The assembly, when subjected to an inward force of 50 lbs. directed normal to the headlamp aiming plane and symmetrically about the center of the sealed beam unit face shall meet the following requirements:

1. The sealed beam unit shall not permanently recede by more than 0.1 in.

<u>Permanent Recession Resulting from Force</u>
<u>Measured</u> <u>Specified Maximum</u>

0.100 in.

2. The aim of the sealed beam unit shall not permanently deviate by more than 1.25 in. at a distance of 25 ft.

<u>Permanent Deviation at 25 ft. Resulting from Force</u>
<u>Measured</u> <u>Specified Maximum</u>

1.25 in.

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## Procedures for Testing Replaceable Bulbs

Measurements shall be carried out in an integrating sphere which is properly painted, calibrated with incandescent lamp standards, fitted with a silicon photo cell, and capable of being adjusted for test sample light absorption. The mounting fixture for holding the bulb assembly shall include separate sockets for high and low beams. Each socket shall be painted white, have Kelvin connentions for supplying and sensing the voltage, and enclose the standardized replaceable light source to the same degree as it is enclosed when installed in a headlamp assembly.

### Integrating Sphere Parameters

- (a) The inside of the sphere shall be clean and evenly painted.
- (b) The paint shall be barium sulfate base as manufactured by Sylvania, Velvet White as manufactured by 3M Corporation, or an equivalent.
- (c) Over the range of 400 - 700 nanometers, the inside of the sphere shall be spectrally flat and shall have a reflectivity of  $85\% \pm 2\%$ .
- (d) The sphere shall be configured to conform with the Illuminating Engineering Society (IES) guidelines as outlined in "IES Practical Guide to Photometry" (IES Journal October 1971).
- (e) The sphere minimum diameter shall be 36 inches.

### Integrating Sphere Calibration

- (a) The standards shall be incandescent lamps and their calibration shall be traceable to NBS.
- (b) The standards selected shall be within  $\pm 50\%$  of the luminous flux measurements (mscp or lumens) of the test samples being measured.
- (c) The sphere shall be calibrated with a minimum of three standard lamps. If the calibration factor obtained for the sphere with any one of the lamp standards differs from the average of the three calibration factors which result from calibrating the sphere with the three lamp standards more than 2%, it shall not be used and another lamp standard shall be selected.
- (d) Standard lamps used for sphere calibration shall be operated at their rated current values as supplied from the standard lamp source.
- (e) Standard lamps shall be operated for at least three minutes prior to calibration of the sphere.

#### Socket Design

- (a) The mounting fixture body shall be covered with a  $\text{BaSO}_4$  paint.
- (b) Separate sockets shall be used for high and low beam filament tests to avoid switching circuitry.
- (c) The bulb assembly shall fit inside the mounting fixture body to the same degree that it is contained in the headlamp assembly socket.
- (d) Kelvin connections, brass and spring loaded or equivalent, shall be a part of the socket so that voltage readings can be made at the socket base independent of the supply voltage leads.

#### Absorption Correction

- (a) Spheres shall be equipped with absorption lamps.

#### Testing Procedure

- (a) After calibration of the sphere, each bulb assembly to be measured shall be operated a minimum of two minutes at its rated voltage prior to taking measurements.

## REPLACEABLE BULB CHARACTERISTICS

### I. Lumens - Wattage

#### TEST PROCEDURE - FMVSS 108

Five additional replaceable bulbs, designated were seasoned with the black caps on at design voltage for a period of time equal to 1 per cent of average rated laboratory life for the major and minor filaments. The caps were then removed using the "Oakite" rust stripper as outlined by the bulb manufacturer, Sylvania, and lumen and wattage measurements were made.

<u>Lamp No.</u> <u>(base horizontal)</u>	<u>Volts</u>	<u>Amperes</u>	<u>Wattage</u>	<u>Lumens</u>
major				
minor				
major				
minor				
major				
minor				
major				
minor				
major				
minor				

\* - Indicates a failure

#### Specified

##### 1. Lumens

High Beam:  $1738 \pm 10\%$

Low Beam:  $1067 \pm 10\%$

##### 2. Wattage - Specified Maximum

High Beam: 65

Low Beam: 45

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BULB LIFE TEST

TEST PROCEDURE - FMVSS 108 - 54.1.1.38(b)(1)

Five bulbs were tested on low beam at 14.0 volts for 320 hours burning time. Five different bulbs were tested on high beam at 14.0 volts for 150 hours burning time.

RESULTS OF TESTS

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## II. Dimensions: Bulb and Lamp No.

### TEST PROCEDURES - FMVSS 108

Some dimensions of bulb and lamp are particularly critical due to the replaceable bulb concept of the system. Figures 3-1, 3-3, 3-5, 3-7 and 3-10 of Docket No. 81-11, Notice 4 are included in this report for reference. Unless noted otherwise, a general tolerance of  $\pm .004$ " applies to all linear dimensions and  $\pm 1^\circ$  to angular dimensions.

<u>Dimension</u>	<u>Measured</u>	<u>Specified</u>
<u>Figure 3-1</u>		
K		1.752 $\pm$ .015
CL High Beam to CL Low Beam		$\pm$ .035
N		1.335 to 1.331
M		.974
P		1.673
R		1.126 to 1.122
AF		.094 $\pm$ .032
AD		.091 $\pm$ .028
<u>Figure 3-3</u>		
B		.289 $\pm$ .010
C		.289 $\pm$ .010
M		.118
S		.025 $\pm$ .002
<u>Figure 3-5</u>		
C		.579 $\pm$ .012
F		.472 min.
G		.197 min.
<u>Figure 3-7</u>		
D		.502
K		.374
N		1.350 to 1.346
P		1.132 to 1.128
<u>Figure 3-10</u>		
AC		.179

## III. Bulb Deflection Test:

One bulb was selected for the test.

### Permanent Deflection Resulting From Force

<u>Measured</u>	<u>Specified Maximum</u>
	0.005 in.

IV. A silicone o-ring was provided with each of the five replaceable bulbs.

TESTS, TEST METHODS AND RESULTS OF TESTS (cont'd)

VIBRATION AND GASOLINE CHEMICAL RESISTANCE TESTS - PHASE II

I. Vibration Test - Lamp Nos.

TEST PROCEDURE - FMVSS 108 - S6.3

See test procedure on page 28.

TEST RESULTS - (Test Date:

II. Gasoline Chemical Resistance Test - Lamp Nos.

TEST PROCEDURE - FMVSS 108 - S6.4(b)(1)

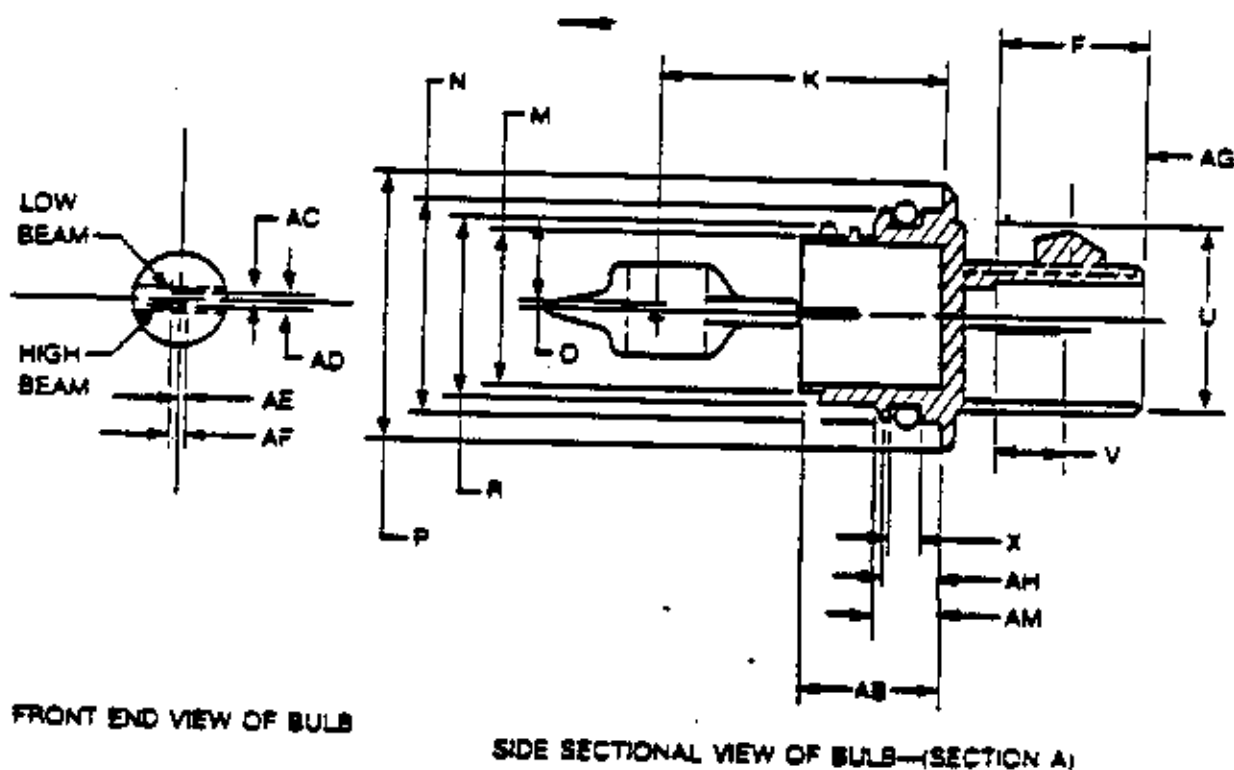
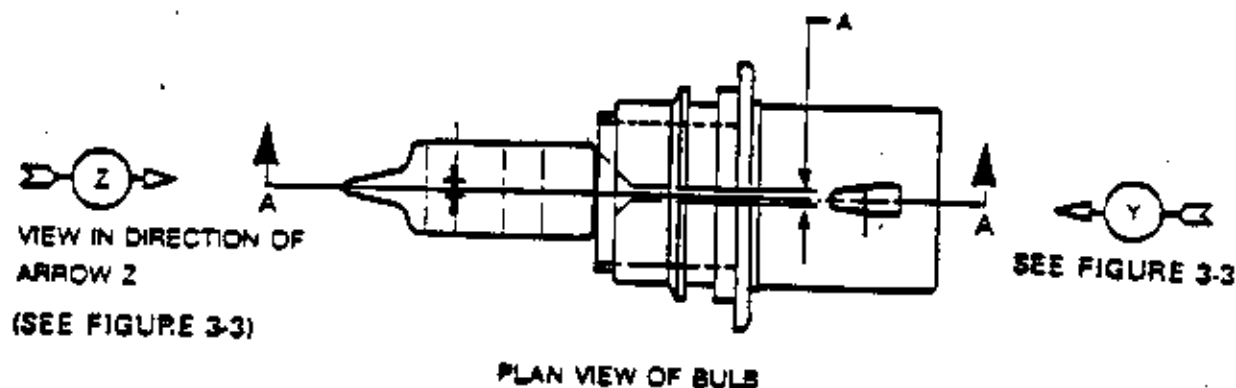
See test procedure on page 26.

TEST RESULTS - (Test Date:

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**Figure 3**  
**SPECIFICATIONS FOR THE STANDARDIZED**  
**REPLACEABLE LIGHT SOURCE**  
**INTERCHANGEABILITY DRAWING**  
**HEADLAMP BULB ASSEMBLY**

Figure 3-1



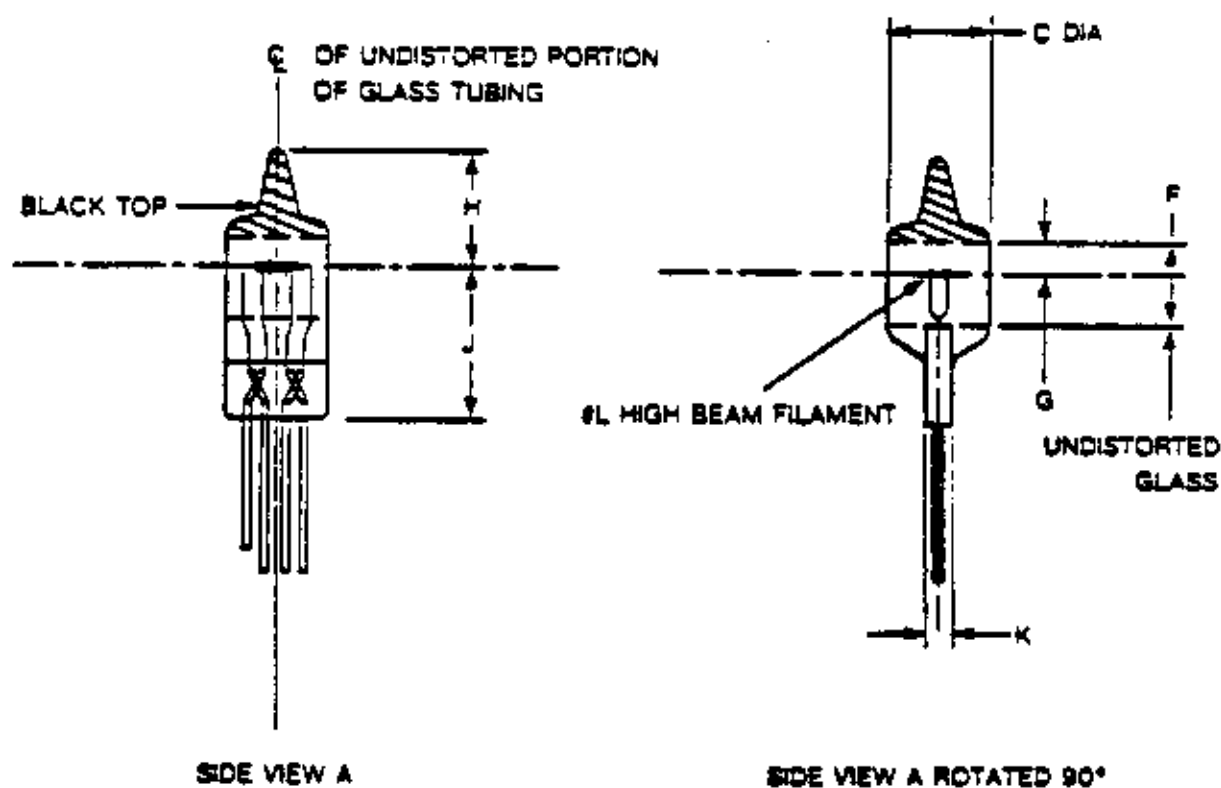
Note: Except for reference dimensions and unless otherwise specified, a general tolerance of  $\pm 0.004$  in (0.10 mm) shall apply to all linear dimensions and  $\pm 1^\circ$  shall apply to all angular dimensions specified in Fig. 3.

**Figure 3-3**



INTERCHANGEABILITY DRAWING  
HEADLAMP BULB ASSEMBLY  
HALOGEN CAPSULE

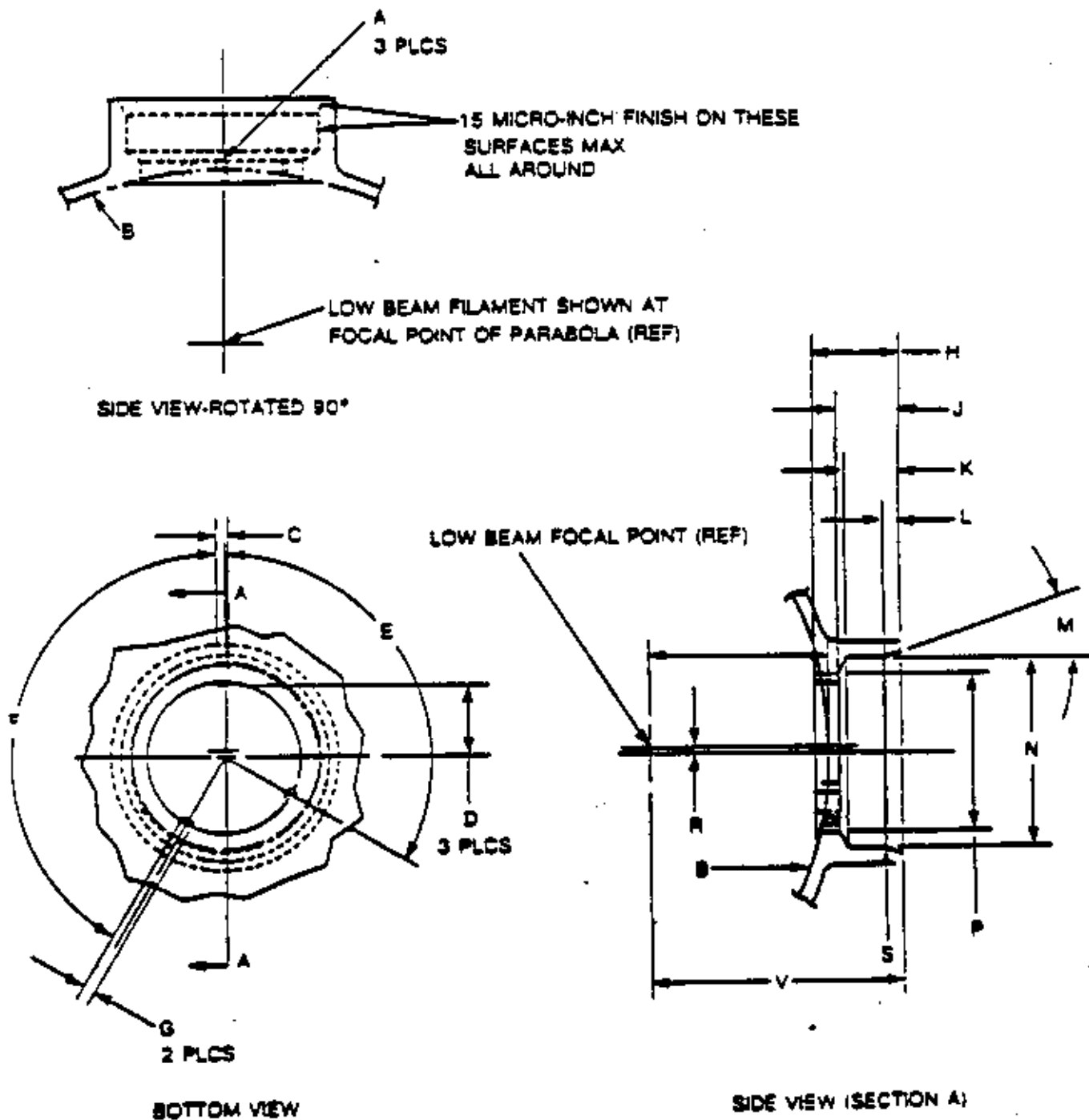
Figure 3-5



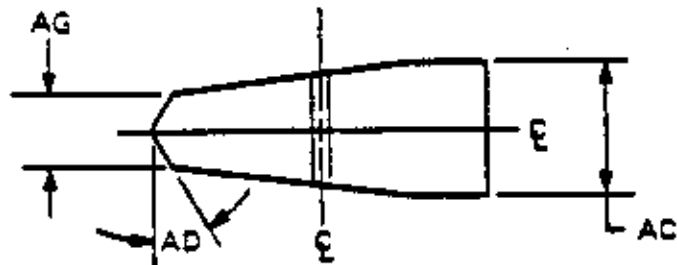
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INTERCHANGEABILITY DRAWING  
HEADLAMP BULB ASSEMBLY  
SOCKET (IN REFLECTOR)

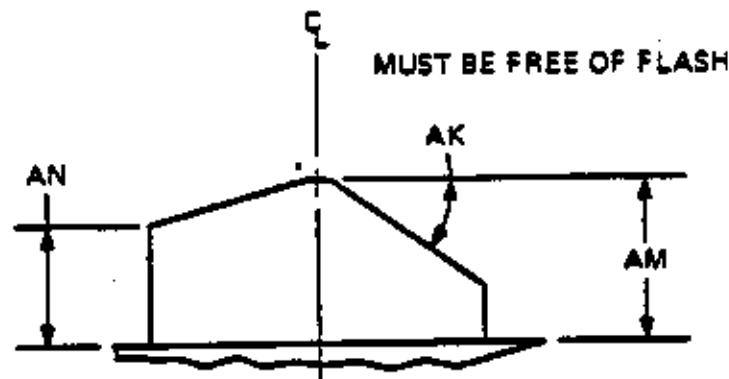
Figure 3-7



**Figure 3-10**  
**INTERCHANGEABILITY DRAWING**  
**HEADLAMP BULB ASSEMBLY**



**EXPLODED VIEW W FOUR TIMES SIZE**



**EXPLODED VIEW OF LOCKING FEATURE**

For Figures 3-11 through 20-25, refer to  
 49 CFR Ch V dated 10-1-86.

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### 3. TAILLAMP TEST PROCEDURE

#### Definitions

##### Taillamp

A lamp used to designate the rear of a vehicle by a warning light.

##### Unobstructed Projected Illumination Area

That area of the lens measured at 45 degrees to the longitudinal axis of the vehicle, excluding reflex.

#### Physical Inspection

Perform the tests below and record data on the appropriate data sheet.

Disassemble the lamp assembly, inspect the housing and lens, and record all markings.

Describe the method of mounting the housing to the vehicle.

Inspect the lamp bulb in the lighting device, and transcribe the trade number designation for that particular type of lamp bulb on the data sheet. If no bulb is supplied, refer to data submission sheet.

Remove the lamp bulb or bulbs from the socket of the lamp, and perform the test listed in Appendix A and record the applicable test data on the data sheet.

##### Unobstructed Projected Illuminated Area Determination

The unobstructed project illuminated area of the lens shall be determined by projection or graphical methods. The unobstructed projected illuminated area shall be at least 2 square inches.



### Photometric test

The device shall be given a photometric test as outlined in Appendix G. The photometer element shall be located at a distance of 100 feet from the test device. A calibrated bulb(s) will be operated at rated mean spherical candlepower. The test devices shall meet the cp specifications listed in the following table.

If the lamp is tested as part of a combination lamp, the appropriate data sheet shall be completed including minimum ratios required between taillamp and signal lamp.

### TAILLAMPS PHOTOMETRIC CP REQUIREMENTS - ONE COMPARTMENT

Photometric (Test distance: 100 feet)  
(Bulb Trade No.)

Test Points	Candlepower	
	Measured	Specified Minimum
10°U-5°L		0.4
5°R		0.4
20°L		0.3
10°L		0.8
5°U-V		1.8
10°R		0.8
20°R		0.3
10°L		0.8
5°L		2.0
Hor.-V		2.0
5°R		2.0
10°R		0.8
20°L		0.3
10°L		0.8
5°D-V		1.8
10°R		0.8
20°R		0.3
10°D-5°L		0.4
5°R		0.4

Specified  
Maximum

18

Horizontal  
and above

Maximum:  
Location:

Bulbs operated at rated mean spherical candlepower.

Volts:

Amperes:

a. Specifications are based on accurate, rated bulbs during testing.

b. Lamps designed for use in both 6v and 12v systems shall be tested with 12v bulbs.

c. A taillamp shall not exceed the listed maximum cp at night over any area larger than that generated by a  $\frac{1}{4}$  degree radius, within a solid cone angle from 20L to 20R and from H to 10U. When the taillamp is combined with the turn and/or stop signal lamp, the signal lamp shall not be less than three times the cp of the taillamp at any test point on or above horizontal except that at H-V, H-5L, H-5R, and 5U-V, the signal lamp shall not be less than five times the cp of the taillamp.

If the measured cp at one or more points fail to meet the requirements, the sums of the cp measured within the affected groups shown below shall be determined. If a group total equals or exceeds that specified, the minimum requirement for that group is satisfied. The computation shall be shown on a separate data sheet in Figure 1. The specified maximums for multiple compartment lamps and multiple lamps will apply.

# PHOTOMETRIC GROUP ANALYSIS - TAILLAMPS

## Minimum Luminous Intensity Requirements

<u>Zone</u>	<u>Test Points Degrees</u>	<u>Measured</u>	<u>Measured</u>	<u>Total for Zone - cd</u>	
				<u>Specified Minimum</u>	<u>1 Comp. 2 Comp.</u>
1	100-5L			1.4	2.4
	50-20L				
	50-20L				
	100-5L				
2	50-10L			2.4	4.2
	H-10L				
	50-10L				
3	50-V			9.6	16.8
	H-5L				
	H-V				
	H-5R				
	50-V				
4	50-10R			2.4	4.2
	H-10R				
	50-10R				
5	100-5R			1.4	2.4
	50-20R				
	50-20R				
	100-5R				

## Specified Maximum

Maximum:

Location:

Bulb operated at rated mean spherical candlepower.

Volts:

Amperes:

Figure 1

#### Color Test

The device shall be tested for color in accordance with the general Color Test procedure as outlined in Appendix F. The color of the device shall be red as defined in the procedure.

#### Vibration Test

The device shall be tested for vibration in accordance with the general Vibration Test procedure as outlined in Appendix B.

#### Dust Test

The device shall be tested for dust in accordance with the general Dust Test procedure as outlined in Appendix D. At the completion of the test, the maximum cp of the device must be within 10 percent of the cp recorded prior to the test.

#### Moisture Test

The device shall be tested for moisture in accordance with the general Moisture Test procedure as outlined in Appendix C. At the completion of the spray and drain periods, the unit should not contain moisture accumulation in excess of 2cc.

#### Corrosion Test

The device shall be tested for corrosion in accordance with the general Corrosion Test procedure as outlined in Appendix E. At the completion of the test, there shall be no evidence of corrosion which impairs the optical performance of the device. If it is suspected that any corrosion present would impair light output, the device shall be rephotometered to determine if the cp requirements are still met.

#### 4. STOP LAMP TEST PROCEDURE

##### Definitions

###### Stop Lamp

A lamp giving a steady warning to the rear of the vehicle, or train of vehicles, to indicate the intention of the operator of a vehicle to diminish speed or stop.

###### Effective Projected Illuminated Area

The area of the lens of each lamp or compartment measured on a plane normal to the axis of the vehicle excluding reflex reflector which is not obstructed by an opaque object such as mounting screw, mounting ring or an ornamental bezel or trim. This includes the area of rings or other configuration (raised portions) molded in the lens as part of the total effective area even if this area does not contribute significantly to total light output.

###### Unobstructed Projected Illuminated Area

The area of the lens defined above measured at 45 degrees to the longitudinal axis of the vehicle.

##### Physical Inspection

Perform the tests below and record data on the appropriate sheet.

Disassemble the lamp assembly, inspect the housing and lens, and record all markings.

Describe the method of mounting the housing on the vehicle.

Inspect the lamp bulb in the lighting device, and transcribe the trade number designation for that particular type of lamp bulb on the data sheet. If no bulb is supplied, refer to the data submission sheet.

Remove the lamp bulb or bulbs from the socket of the lamp, and perform the test listed in Appendix A and record the applicable test data on the data sheet.

#### Effective Projected Illuminated Area

The effective projected illuminated area of the lens of each lamp or compartment shall be determined by the projection or graphical method. The effective projected illuminated area shall be at least  $3\frac{1}{2}$  square inches for vehicles less than 80-inches wide, and 12 square inches for vehicles more than 80-inches wide.

#### Unobstructed Illuminated Area Determination

The unobstructed illuminated areas of the lens of each lamp or compartment shall be determined by projection or graphical methods. The unobstructed areas shall be at least 2 square inches.

#### Photometric Test

The device shall be given a photometric test as outlined in Appendix G. The photometer shall be located at a distance of 100 feet from the test device. The test devices shall meet the cp specifications listed on the following table.

If the lamp is tested in combination with a taillamp, the appropriate data sheet shall be completed, including minimum ratios required between the signal lamp and the taillamp.

**STOP AND RED TURN SIGNAL LAMPS  
PHOTOMETRIC CP REQUIREMENTS - ONE COMPARTMENT**

<u>Test Points</u>	<u>Stop Lamp</u>	
	<u>Measured</u>	<u>Specified Minimum</u>
10°U-5°L		16
5°R		16
20°L		10
10°L		30
5°U-V		70
10°R		30
20°R		10
10°L		40
5°L		80
Hor.-V		80
5°R		80
10°R		40
20°L		10
10°L		30
5°D-V		70
10°R		30
20°R		10
10°D-5°L		16
5°R		16
		<u>Specified Maximum</u>
		300

Maximum:  
Location:

Bulbs operated at rated mean spherical candlepower.  
Volts:  
Amperes:

The maximum shall not be exceeded over any area larger than that generated by a 1/4 degree radius.

If the measured cp at one or more points fail to meet the requirements, the sums of the cp measured within the affected groups shown below shall be determined. If a group total equals or exceeds that specified in the following table, the minimum requirement for that group is satisfied. The computation shall be shown on a separate data sheet. The specified maximums for multiple compartment lamps and multiple lamps will apply.

See Standard Notes 1 and 3

# ZONE REQUIREMENTS - STOP LAMPS

## Minimum Luminous Intensity Requirements

Zone	Test Points Degrees	Measured	Measured	Total for Zone - cd	
				Specified Minimum 1 Comp.	2 Comp.
1	10U-5L			52	61
	5U-20L				
	5D-20L				
	10D-5L				
2	5U-10L			100	118
	H-10L				
	5D-10L				
	5U-V				
3	H-5L			380	451
	H-V				
	H-5R				
	5D-V				
4	5U-10R			100	118
	H-10R				
	5D-10R				
	10U-5R			52	61
5	5U-20R				
	5D-20R				
	10D-5R				
				Specified Maximum	

Maximum:

Location:

Bulb operated at rated mean spherical candlepower.

Volts:

Amperes:

### Color Test

The test device shall be tested for color in accordance with the general Color Test procedure as outlined in Appendix F. The color of the device shall be red as defined in the procedure.

### Vibration Test

The device shall be tested for vibration in accordance with the general Vibration Test procedure as outlined in Appendix B.

### Dust Test

The device shall be tested for dust in accordance with the general Dust Test procedure as outlined in Appendix D. At the completion of the test, the maximum cp of the device must be within 10 percent of the cp recorded prior to the test.

### Moisture Test

The device shall be tested for moisture in accordance with the general Moisture Test procedure as outlined in Appendix C. At the completion of the spray and drain periods, the unit should not contain moisture accumulation in excess of 2cc.



### Corrosion Test

The device shall be tested for corrosion in accordance with the general Corrosion Test procedure as outlined in Appendix E. At the completion of the test, there shall be no evidence of corrosion which impairs the optical performance of the device. If it is suspected that any corrosion present impairs light output, the device shall be rephotometered to determine if the cp requirements are still met.

#### 4A. HIGH-MOUNTED STOP LAMP TEST PROCEDURE

Each high-mounted stop lamp shall:

- (a) Have an effective projected luminous area not less than 4 1/2 square inches.
- (b) Have a signal visible to the rear through a horizontal angle from 45 degrees to the left to 45 degrees to the right of the longitudinal axis.
- (c) Have the minimum photometric values in the amount and location listed in the table below. At H-V the intensity shall be not less than 25 and not more than 160 candela.
- (d) Provide access for convenient replacement of the bulb without the use of special tools.
- (e) No high-mounted stop lamp shall be combined with any other lamp or reflective device.
- (f) Shall be designed to conform to SAE Recommended Practice J186a, except the requirements of paragraphs 3.1.6 Moisture Test, 3.1.7 Dust Test and 3.1.8 Corrosion Test of SAE J186a do not apply for units mounted inside the vehicle. Also, the photometric requirements of SAE J186a do not apply. Instead, the following values shall be met:

Test Points	Red	
	Minimum (cd)	Maximum (cd)
10U 10L	8	
10U V	16	
10U 10R	8	
5U/5D 10L	16	
5U/5D 5L	25	
5U/5D V	25	
5U/5D 5R	25	
5U/5D 10R	16	
H 10L	16	
H 5L	25	
H V	25	160*
H 5R	25	
H 10R	16	

\*The lamp shall not exceed the listed maximum over an area larger than that generated by a 1/4 degree radius within a solid cone angle from 10L to 10R and 10U to 5D.

- (g) Testing for photometric performance of high-mounted stop lamps which are installed inside vehicles shall be made with glazing from the same vehicle in place, at the angular relationship to the lamp which exists in the vehicle.

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## 5. LICENSE PLATE LAMP TEST PROCEDURE

### Definition

#### License Plate Lamp

A lamp used to illuminate the license plate on the rear of a vehicle.

### Physical Inspection

Perform the tests below and record data on the appropriate data sheet.

Disassemble the lamp assembly, inspect the housing and lens, and record all markings.

Describe the method of mounting the housing to the vehicle.

Inspect the lamp bulb in the lighting device and transcribe the trade number designation for that particular type of lamp bulb on the data sheet. If no bulb is supplied, refer to data submission sheet.

Remove the lamp bulb from the socket of the lamp, and perform the test listed in Appendix A and record the applicable test data on the data sheet.

### Photometric Test

The device shall be given a photometric test as outlined in Appendix G.

All measurements shall be made on a rectangular test plate of clean, white blotting paper mounted on the license plate holder in the position taken by the license plate. The face of the test plate shall be 1/16 inch from the face of the license plate holder. The test plate shall have the dimensions shown in Figure 1 or 2, as applicable.

The illumination of each of the stations on the test plate shall be at least .75 footcandles. The ratio of maximum to minimum illumination shall not exceed 20 to 1. The average

of the two highest and the two lowest illumination's values recorded at the eight test stations shall be taken as maximum and minimum values respectively.

Determine the angle of incident light on the plate. The angle shall not be less than 5 degrees. Record the angle on the appropriate data sheet.

#### Color Test

The device shall be tested for color in accordance with the general Color Test procedure as outlined in Appendix F. The color of the device shall be white, as defined in that procedure.

#### Vibration Test

The device shall be tested for vibration in accordance with the general Vibration Test procedure as outlined in Appendix B.

#### Dust Test

The device shall be tested for dust in accordance with the general Dust Test procedure as outlined in Appendix D. At the completion of the test, the maximum cp of the device must be within 10 percent of the cp recorded prior to the test.

#### Moisture Test

The device shall be tested for moisture in accordance with the general Moisture Test procedure as outlined in Appendix C. At the completion of the spray and drain periods, the unit should not contain moisture accumulation in excess of 2cc.

#### Corrosion Test

The device shall be tested for corrosion in accordance with the general Corrosion Test procedure as outlined in Appendix E. At the completion of the test, there shall be no evidence of corrosion which impairs the optical performance of the device. If it is suspected that any corrosion present impairs light output, the device shall be rephotometered to determine if the cp requirements are still met.

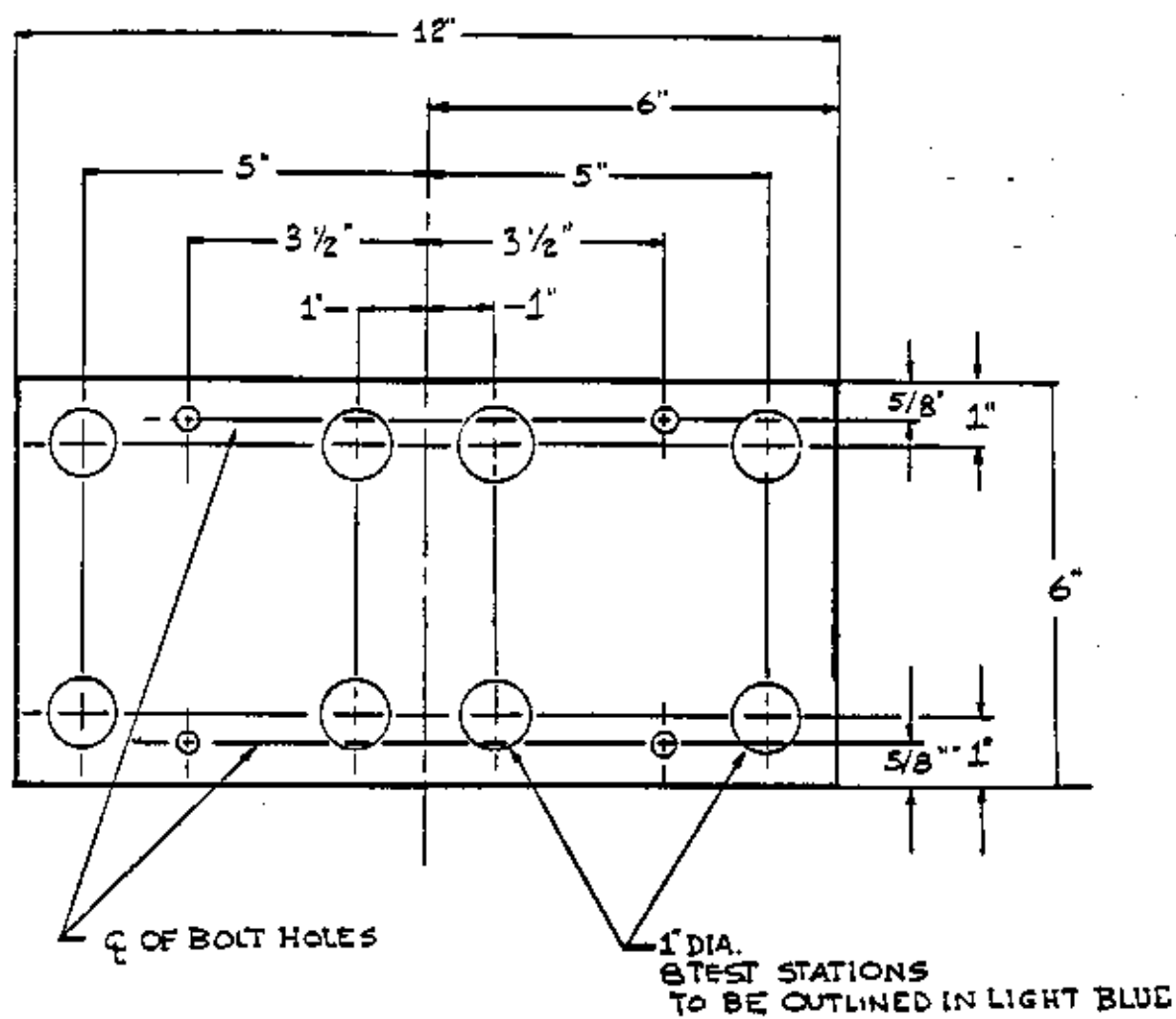


FIGURE 1



## 6. REFLEX REFLECTOR TEST PROCEDURE

### Definitions

#### Reflex Reflector

A device used on vehicles to give an indication to an approaching driver by reflected light from the lamps on the approaching vehicle.

#### Physical Inspection

The device shall be physically inspected. Record all markings.

#### Photometric Test

The device shall be given a photometric test as outlined in Appendix G. The photometer shall be located at a distance of 100 feet from the test device. The source of illumination shall be a lamp with a 2 inch effective diameter and with a filament operating at 2854 K color temperature. The test setup shall be made in accordance with the Photometric Test procedure in Appendix G.

Reflex reflectors, which by their design or construction, permit mounting on the vehicle in fixed rotational position, shall be tested in this position. A visual locator, such as the word "TOP" shall not be considered adequate to establish a fixed rotational position on the vehicle.

Reflex reflectors, which do not have a fixed rotational position on the vehicle, shall be rotated about their axis through 360 degrees to find the minimum cp per footcandle which shall be reported for each test point. If the output falls below the minimum requirement at any test point, the reflector shall be rotated  $\pm 5$  degrees about its axis from the angle where the minimum output occurred; and the maximum cp per footcandle within this angle shall be reported as a tolerance value.

If uncolored reflections from the front surface interfere with photometric readings at any test point, measurements shall be made 1 degree above, below, right, and left of the test point. The lowest of these readings and its location shall be reported.

The reflex reflector shall conform to the following table.

MINIMUM CP PER INCIDENT FOOTCANDLE  
FOR CLASS A REFLEX REFLECTOR

Observation Angle, Degree	Entrance Angle, Degree				
	0	10 up	10 down	20 left	20 right
	Red				
0.2	4.5	3.0	3.0	1.5	1.5
1.5	0.07	0.05	0.05	0.03	0.03
	Yellow				
0.2	11.25	7.5	7.5	3.75	3.75
1.5	0.17	0.12	0.12	0.07	0.07

Color Test

The device shall be tested for color in accordance with the general Color Test procedure as outlined in Appendix F. The color of the device shall be yellow or red, as defined in that procedure.

Vibration Test

The device shall be tested for vibration in accordance with the general Vibration Test procedure as outlined in Appendix B.

Dust Test

The device shall be tested for dust in accordance with the general Dust Test procedure as outlined in Appendix D. At the completion of the test, the maximum cp of the device must be within 10 percent of the cp recorded prior to the test. The Dust Test shall not be conducted on sealed devices.

Moisture Test

The device shall be tested for moisture in accordance with the general Moisture Test procedure as outlined in Appendix C. At the completion of the spray and drain periods, the device shall not contain moisture accumulation in excess of 2cc. Sealed devices shall contain no visible moisture within the device.



### Corrosion Test

The device shall be tested for corrosion in accordance with the general Corrosion Test procedure as outlined in Appendix E. At the completion of the test there shall be no evidence of corrosion which impairs the optical performance of the device. If it is suspected that any corrosion present impairs light output, the device shall be rephotometered to determine if the cp requirements are still met.

## 7. SIDEMARKER LAMP TEST PROCEDURE

### Definitions

#### Sidemarker Lamp

A lamp, affixed to the side of the vehicle, delineating its overall length.

### Physical Inspection

The device shall be physically inspected. Perform the tests below and record data on the appropriate data sheet.

Disassemble the lamp assembly, inspect the housing and lens, and record all markings.

Describe the method of mounting the housing to the vehicle.

Inspect the lamp bulb in the lighting device, and transcribe the trade number designation for that particular type of lamp bulb on the data sheet. If no bulb is supplied, refer to data submission sheet.

Remove the lamp bulb from the socket of the lamp, and perform the tests listed in Appendix A and record the applicable test data on the data sheet.

### Photometric Test

The device shall be given a photometric test in accordance with Appendix G. The photometer shall be located at a distance of 100 feet from the test device. The test devices shall meet the photometric values specified below except that, for vehicles less than 80-inches wide and less than 30 feet overall length may meet the photometric requirements for inboard test points at a distance 15 feet from the vehicle and on a vertical plane that is perpendicular to the axis on the vehicle and located midway between the front and rear sidemarker lamps.

## PHOTOMETRIC MINIMUM CP REQUIREMENTS

	Test Points Degree	Red	Yellow (Amber)
10U	45L	0.25	0.62
	V	0.25	0.62
	45R	0.25	0.62
H	45L	0.25	0.62
	V	0.25	0.62
	45R	0.25	0.62
10D	45L	0.25	0.62
	V	0.25	0.62
	45R	0.25	0.62

### Color Test

The device shall be tested for color in accordance with the general Color Test procedure as outlined in Appendix F. The color of the device shall be red or yellow as defined in the procedure.

### Vibration Test

The device shall be tested for vibration in accordance with the general Vibration Test procedure as outlined in Appendix B.

### Dust Test

The device shall be tested for dust in accordance with the general Dust Test procedure as outlined in Appendix D. At the completion of the test, the maximum cp of the device must be within 10 percent of the cp recorded prior to the test.

#### Moisture Test

The device shall be tested for moisture in accordance with the general Moisture Test procedure as outlined in Appendix C. At the completion of the spray and drain periods, the unit should not contain moisture accumulation in excess of 2cc.

#### Corrosion Test

The device shall be tested for corrosion in accordance with the general Corrosion Test procedure as outlined in Appendix E. At the completion of the test there shall be no evidence of corrosion which impairs the optical performance of the device. If it is suspected that any corrosion present impairs light output, the device shall be rephotometered to determine if the cp requirements are still met.

## 8. PARKING LAMP TEST PROCEDURE

### Definitions

#### Parking Lamps

Lamps which show to the front of the vehicle to mark the vehicle when parked and serve as a reserve front position indicating system.

### Physical Inspection

Perform the tests below and record data on the appropriate data sheet.

Disassemble the lamp assembly, inspect the housing and lens, and record all markings.

Describe the method of mounting the housing to the vehicle.

Inspect the lamp bulb in the lighting device, and transcribe the trade number designation for that particular type of lamp bulb on the data sheet. If no bulb is supplied, refer to data submission sheet.

Remove the lamp bulb from the socket of the lamp, and perform the tests listed in Appendix A and record the applicable test data on the data sheet.

### Photometric Test

The device shall be given a photometric test in accordance with Appendix G. The photometer shall be located at a distance of 100 feet from the test device. The test devices shall meet the cp specifications listed in the following table.

If a parking lamp is optically combined with a turn signal, the turn signal shall not be less than three times the cp of the parking lamp at any test point on or above horizontal except that at H-V, H-5L, H-5R, and 5U-V the turn signal shall not be less than five times the cp of the parking lamp.

If the lamp is tested as part of a combination lamp, the appropriate data sheet shall be completed including minimum ratios required between the parking and the turn signal lamp.

# PARKING LAMPS

Photometric (Test distance: 100 feet)  
(Bulb Trade No.)

Test Points	<u>Candlepower</u> <u>Parking Lamp</u>	
	<u>Measured</u>	<u>Specified</u> <u>Min.</u> <u>Max.</u>
10°D-5°L		0.8 125
5°R		0.8 125
20°L		0.4 125
10°L		0.8 125
5°U-V		2.8 125
10°R		0.8 125
20°R		0.4 125
10°L		1.4 125
5°L		3.6 125
Hor.-V		4.0 125
5°R		3.6 125
10°R		1.4 125
20°L		0.4 250
10°L		0.8 250
5°D-V		2.8 250
10°R		0.8 250
20°R		0.4 250
10°D-5°L		0.8 250
5°R		0.8 250

Maximum:  
Location:

Bulbs operated at rated mean spherical candlepower.

Volts:

Amperes:

\*Not flashing during test

If the measured cp at one or more points fail to meet the requirements, the sum of the cp measured within the affected group shown below shall be determined. If the group total equals or exceeds that specified below, the minimum requirement for that group is satisfied. The computation shall be shown on a separate data sheet.

# Minimum Luminous Intensity Requirements

<u>Zone</u>	<u>Test Points Degrees</u>	<u>Measured</u>	<u>Measured</u>	<u>Total for Zone - cd</u>
				<u>Specified Minimum 1 Compartment</u>
1	10U-5L			2.4
	5U-20L			
	5D-20L			
	10D-5L			
2	5U-10L			3.0
	H-10L			
	5D-10L			
3	5U-V			16.8
	H-5L			
	H-V			
	H-5R			
4	5D-V			3.0
	5U-10R			
	H-10R			
5	5D-10R			2.4
	10U-5R			
	5U-20R			
	5D-20R			
	10D-5R			

Specified Maximum

Maximum:

Location:

Bulb operated at rated mean spherical candlepower.

Volts:

Amperes:

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#### Dust Test

The device shall be tested for dust in accordance with the general Dust Test procedure as outlined in Appendix D. At the completion of the test, the maximum cp of the device must be within 10 percent of the cp recorded prior to the test.

#### Moisture Test

The device shall be tested for moisture in accordance with the general Moisture Test procedure as outlined in Appendix C. At the completion of the spray and drain periods, the unit should not contain moisture accumulation in excess of 2cc.

#### Corrosion Test

The device shall be tested for corrosion in accordance with the general Corrosion Test procedure as outlined in Appendix E. At the completion of the test, there shall be no evidence of corrosion which impairs the optical performance of the device. If it is suspected that any corrosion present impairs light output, the device shall be rephotometered to determine if the cp requirements are still met.



## 9. BACKUP LAMP TEST PROCEDURE

### Definition

#### Backup Lamp

A lamp which illuminates the road to the rear of the vehicle when the vehicle's transmission is in reverse position with the ignition switch energized.

### Physical Inspection

Performs the tests below and record data on the appropriate data sheet.

Disassemble the lamp assembly, inspect the housing and lens and record all markings.

Describe the method of mounting the housing to the vehicle.

Inspect the lamp bulb in the lighting device, and transcribe the trade number designation for that particular type of lamp bulb on the data sheet. If no bulb is supplied, refer to data submission sheet.

Remove the lamp bulb from the socket of the lamp, and perform the tests listed in Appendix A and record the applicable test data on the data sheet.

### Photometric Test

The device shall be given a photometric test as outlined in Appendix G. The photometer shall be located at a distance of 100 feet from the test device. The test device shall meet the cp specifications of the following table:

From each lamp in a two-lamp system

# PHOTOMETRIC MINIMUM CP REQUIREMENTS

Test Points	45L	30L	10L	V	10R	30R	45R
10U			10	15	10		
5U	15		20	25	20		15
H	15	25	50	50	50	25	15
5D	15	25	50	50	50	25	15

Maximum (Per Lamp) 300 CP at H and above

If the measured cp at one or more points fail to meet the requirements, the sum of the cp measured within the affected groups shown below shall be determined. If the group total equals or exceeds that specified below, the minimum requirement for that group is satisfied. The computation shall be shown on a separate data sheet.

Group No.	1	2	3
Test Points	45L-5U 45L-H 45L-5D	30L-H 30L-5D	10L-10U, 10L-5U V-10U, V-5U 10R-10U, 10R-5U
Minimum Group Total	45	50	100

Group No.	4	5	6
Test Points	10L-H, 10L-5D V-H, V-5D 10R-H, 10R-5D	30R-H 30R-5D	45R-5U 45R-H 45R-5D
Minimum Group Total	360	50	45

When two lamps of the same or symmetrically opposite design are used, the reading along the vertical axis and the averages of the readings for the same angles left and right of vertical for one lamp shall be used to determine compliance with the requirements. If two lamps of differing designs are used, they shall be tested individually and the values added to determine that the combined units meet twice the candela requirements.

When only one backup lamp is used on the vehicle, it shall be tested to twice the candela requirements.

### Color Test

The devices shall be tested for color in accordance with the general Color Test procedure as outlined in Appendix F. The color of the device shall be white, as defined in that procedure. A backup lamp may project incidental red, yellow, or white light through reflectors or lenses that are adjacent close to or part of the lamp assembly.

### Vibration Test

The device shall be tested for vibration in accordance with the general Vibration Test Procedure as outlined in Appendix B.

### Dust Test

The device shall be tested for dust in accordance with the general Dust Test procedure as outlined in Appendix D. At the completion of the test, the maximum cp of the device must be within 10 percent of the cp recorded prior to the test.

### Moisture Test

The device shall be tested for moisture in accordance with the general Moisture Test procedure as outlined in Appendix C. At the completion of the spray and drain periods, the unit should not contain moisture accumulation in excess of 2cc.

### Corrosion Test

The device shall be tested for corrosion in accordance with the general Corrosion Test procedure as outlined in Appendix E. At the completion of the test, there shall be no evidence of corrosion which impairs the optical performance of the device. If it is suspected that any corrosion present impairs light output, the device shall be rephotometered to determine if the cp requirements are still met.

## 10. TURN SIGNAL LAMP TEST PROCEDURE

### Definition

#### Turn Signal Lamp

A lamp that is the signalling element of a turn signal system which indicates a change in direction by flashing warning lights on the side toward which the turn will be made.

#### Effective Projected Illuminated Area

The area of the lens measured on a plane parallel to the axis of the vehicle, excluding reflex reflector, which is not obstructed by an opaque object such as a mounting screw, mounting ring or an ornamental bezel or trim. This includes the area of rings or other configurations (raised portions) molded in the lens as part of the total area, even if such areas do not contribute significantly to total light output.

#### Unobstructed Projected Illuminated Area

The area of the lens defined above measured at 45 degrees to the longitudinal axis of the vehicle.

### Physical Inspection

Perform the tests below and record data on the appropriate data sheet.

Disassemble the lamp assembly, inspect the housing and lens, and record all markings.

Describe the method of mounting the housing to the vehicle.

Inspect the lamp bulb in the lighting device, and transcribe the trade number designation for that particular type of lamp bulb on the data sheet. If no bulb is supplied, refer to data submission sheet.

Remove the lamp bulb or bulbs from the socket of the lamp, and perform the tests listed in Appendix A and record the applicable test data on the data sheet.

### Projected Illuminated Area Determination

Both the effective and unobstructed projected illuminated areas of the lens shall be determined by projection or graphical methods. The unobstructed area shall be at least 2 square inches. The effective area shall be at least 12 square inches for vehicles over 80 inches wide and  $3\frac{1}{2}$  square inches for vehicles less than 80 inches wide.

### Photometric Test

The device shall be given a photometric test in accordance with Appendix G. The photometer shall be located at a distance of 100 feet from the test device. The test devices shall meet the cp specification listed in the table below.

#### TURN SIGNAL PHOTOMETRIC MINIMUM CP REQUIREMENTS

Test Points	Measured	Specified Minimum <u>*Rear -Yellow Single Comp.</u>	Specified Minimum <u>*Closer Than 4" to Headlamp</u>	Specified Minimum <u>More Than 4" From Headlamp</u>
10°U-5°L		26	100	40
5°R		26	100	40
20°L		16	63	25
10°L		49	188	75
5°U-V		114	438	175
10°R		49	188	75
20°R		16	63	25
10°L		65	250	100
5°L		130	500	200
Hor. -V		130	500	200
5°R		130	500	200
10°R		65	250	100
20°L		16	63	25
10°L		49	188	75
5°D-V		114	438	175
10°R		49	188	75
20°R		16	63	25
10°D-5°L		26	100	40
5°R		26	100	40

Specified  
Maximum  
750

\*Not flashing during test  
See standard Note 1

Maximum:  
Location:

Bulbs operated at rated mean spherical candlepower.  
Volts:  
Amperes:

(a) Lamps designed for use in both 6v and 12v systems shall be tested with 12v bulbs.

(b) Lamps shall not exceed the specified maximum cp over any area larger than that generated by a  $\frac{1}{4}$ -degree radius.

(c) The maximum shall be 300, 360, and 420 cp for one, two, and three compartments, respectively in red and 900 for yellow rear turn signals.

If the lamp is tested as part of a combination lamp, the appropriate data sheet will be completed including required ratios between the turn signal and parking or taillamps.

If the measured cp at one or more points fail to meet the requirements, the sums of the cp measured within the affected groups shown below shall be determined. If a group total equals or exceeds that specified, the minimum requirement for that group is satisfied. The computation shall be shown on a separate data sheet. The specified maximums for multiple compartment lamps and multiple lamps will apply.

Zone	Test Points Degrees	Required Rear Red		Minimum CP For Rear Yellow		Zone - One & Two Compartments			
		1	2	1	2	Front-Less Than 4"		Front -More Than 4"	
						1	2	1 Comp.	2 Comp.
1	10U-5L								
	5U-20L	52	61	84	97	325	390	143	156
	5D-20L								
2	10D-5L								
	5U-10L								
	H-10L	100	118	162	187	625	750	275	300
3	5D-10L								
	5U-V								
	H-5L								
	H-V	380	451	617	712	2375	2850	1045	1140
	H-5R								
	5D-V								
4	5U-10R								
	H-10R	100	118	162	187	625	750	275	300
	5D-10R								
5	10U-5R								
	5U-20R	52	61	84	97	325	390	143	156
	5D-20R								
	10D-5R								

#### Color Test

The device shall be tested for color in accordance with the general Color Test procedure as outlined in Appendix F. The color of the device shall be red or yellow for the rear and yellow for the front as defined in the procedure.

#### Vibration Test

The device shall be tested for vibration in accordance with the general Vibration Test procedure as outlined in Appendix B.

#### Dust Test

The device shall be tested for dust in accordance with the general Dust Test procedure as outlined in Appendix D. At the completion of the test, the maximum cp of the device must be within 10 percent of the cp recorded prior to the test.

#### Moisture Test

The device shall be tested for moisture in accordance with the general Moisture Test procedure as outlined in Appendix C. At the completion of the spray and drain periods, the unit should not contain moisture accumulation in excess of 2cc.

#### Corrosion Test

The device shall be tested for corrosion in accordance with the general Corrosion Test procedure as outlined in Appendix E. At the completion of the test there shall be no evidence of corrosion which impairs the optical performance of the device. If it is suspected that any corrosion present impairs light output, the device shall be rephotometered to determine if the cp requirements are still met.

## 11. TURN SIGNAL OPERATING UNITS TEST PROCEDURE

### Definition

#### Turn Signal Operating Unit

A unit that is part of the turn signal system by which the operator of a vehicle causes the turn signal lamps to function.

### Physical Inspection

The device shall be physically inspected. Record all markings on the appropriate data sheet.

### Durability Test

The operating unit shall be tested with a load equal to 93-98 percent of the total rated load as specified by the data submission sheet. The voltage drop from the input terminal of the switch to each lamp terminal (including 3 inches of No. 16 or 18 gage wire on each side of the switch) shall be measured at the beginning and end of the durability test and at intervals of 25,000 cycles during the test. (The flasher is not to be included in the circuit during the test.) When the unit is provided with a self-cancelling mechanism, the test equipment shall be arranged so that the unit will be turned "off" in its normal operating manner. Bulbs may be replaced during the period of test.

The test shall be made at a rate of 12 to 15 CPM. One complete cycle should consist of the following sequence: off, left turn, off, right turn, and back to off. During the test, the unit should be operated at  $6.4 \pm .05V$  for 6 volt systems or  $12.8 \pm .05V$  for 12 volt systems from a power supply with the specified requirements.

The operating units shall be subjected to the following test:



(a) Units for passenger cars, multipurpose passenger vehicles of less than 80 inches overall width.

100,000 cycles

(b) Units for motorcycles.

50,000

(c) Vehicles over 80 inches overall width.

175,000 cycles

Voltage drop across the test unit (including 3 inches of No. 16 or 18 wire on each side of the switch) shall not exceed 0.25 volts. The unit should still be operative after completion of the tests. If stop signals operate through the turn signal switch, the voltage drops of any additional switch contacts should meet the same requirements as the turn signal contacts.

The results of this test shall be recorded on the appropriate data sheet.

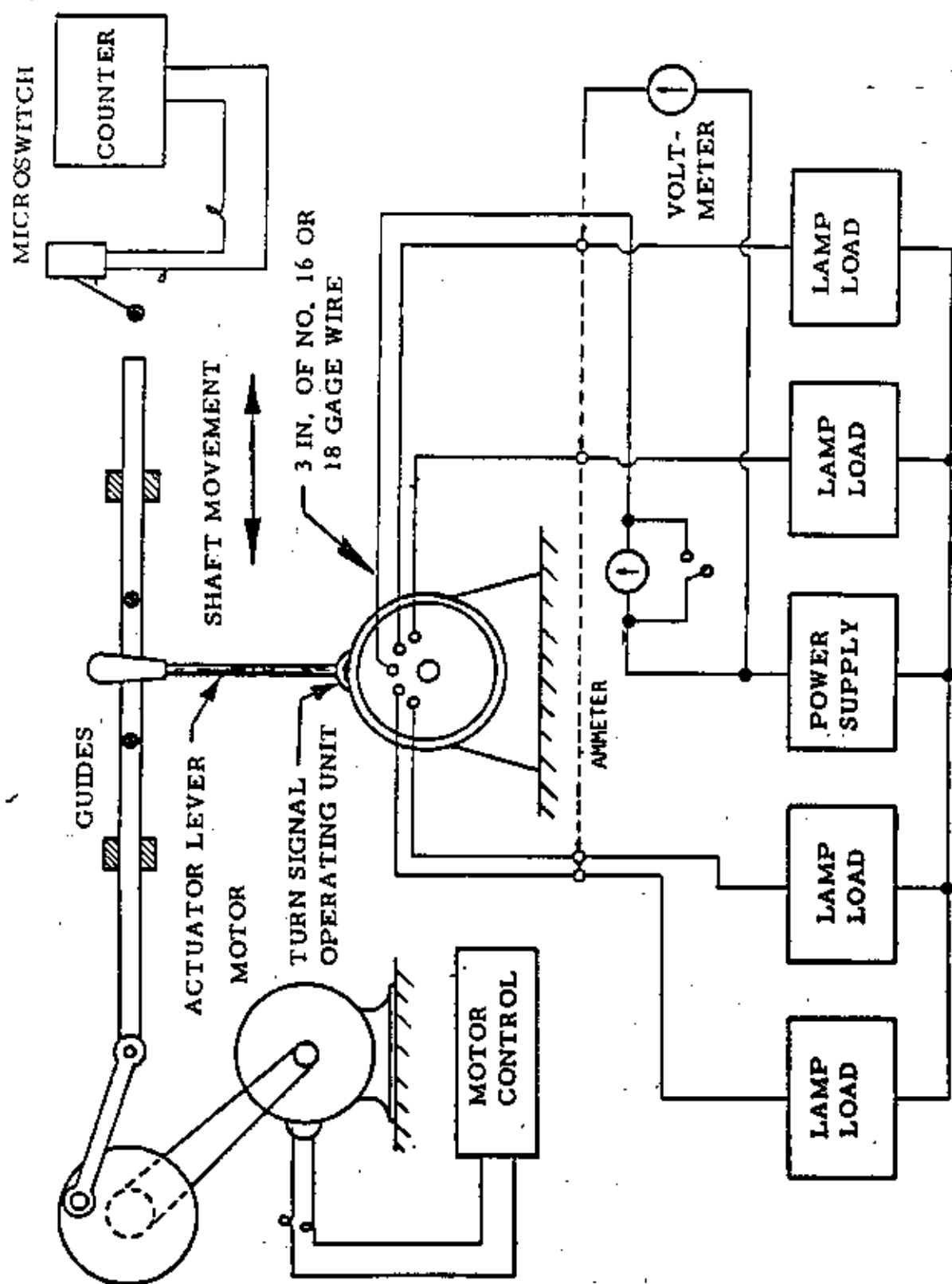
#### EQUIPMENT

The minimum equipment described below shall be utilized for measuring the test parameters:

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Cycling Stand	12-15 cpm	N/A
Stop Watch	0-30 minutes	$\pm 1$ second
Counter	0-25,000 cycles	$\pm 1$ count
Load Lamp	N/A	N/A
Voltmeter	0-20 volts DC	$\pm 0.05$ volts
Millivoltmeter	0-500 mv	$\pm 5.0$ millivolts
Ammeter	0-15 amps DC	$\pm 0.05$ amps
Power Supply	6.4/12.8 volts DC	$\pm 0.05$ volts

- (a) Output current approximately 10 times load current.
- (b) Regulation - Five percent or less.
- (c) Ripple voltage - Not more than five percent.
- (d) Response time - Not more than 25 millisecond rise time from zero to the rated current at the rated voltage in pure resistance circuit.
- (e) Output impedance - Not more than 0.005 ohms (DC)

The units shall be tested on a device similar to that shown below.



**NOTE:** For operating units which are activated by a different type of actuator lever motion, changes in the actuator arm

SIGNAL OPERATING UNIT TEST SETUP

## 12. TURN SIGNAL FLASHER TEST PROCEDURE

### Definition

#### Turn Signal Flasher

A device which causes the required signal lights to flash.

### Physical Inspection

All devices shall be physically inspected. Record the external appearance and all markings.

### Calibration of Standard Test Circuit

The standard test circuit is shown in Figure 1.

Measure the circuit resistance at "A-B" with the flasher and bulb load shorted-out with a shunt resistance not to exceed 0.005 ohms. This resistance shall be  $0.10 \pm 0.01$  ohms.

Adjust the voltage at the bulbs to 12.8v (6.4V) as required for testing, at "C-D" with the flasher shorted out by an effective shunt resistance not to exceed 0.005 ohms. The load current shall be held to the rated value for the total flasher design load within 0.5 percent at 12.8V (6.4V) by simultaneously adjusting trimmer resistors R.

For testing fixed load flashers at other required voltages, adjust the power supply to provide required voltages, at required temperatures at "C-D" without readjustment of trimming resistors R.

With a high impedance voltage recorder connected to points "X-Y" measure the data required for tests. The measurement of these quantities shall not disturb the circuit.

### Performance Tests

Twenty flashers shall be selected at random from the 50 submitted for test. These 20 flashers shall be connected in a circuit as shown below oriented in the mounting position specified by the manufacturer. The load imposed on the flashers shall be the design load as specified by the manufacturer  $\pm 0.5$  percent. The voltage shall be adjusted to design voltage at the bulbs, unless otherwise specified. The power source shall be as specified in the equipment section of this procedure.

### Starting Time Test

Normally closed type flashers shall open (turn off) within 1.0 seconds for a unit designed to operate two signal lamps, or within 1.25 seconds for a unit designed to operate more than two signal lamps. Normally open type flashers shall complete the first cycle (close the contacts and then open the contacts) within 1.5 seconds. The time measurement will start when the voltage is initially applied. The test shall be made in an ambient temperature of  $75 \pm 10^{\circ}\text{F}$ .

Findings shall be based on an average of three starts, which shall be separated by a cooling interval of at least 5 minutes. Results of the test shall be recorded on the appropriate data sheet.

### Voltage Drop Test

Voltage drop shall be measured between the input and the load terminals at the flasher during the "on" period. After the flashers have completed a minimum of five cycles, the lowest voltage drop during three consecutive cycles shall be recorded.

The lowest voltage drop across the flasher during three consecutive cycles shall not exceed 0.8 volts.

Results shall be recorded on the appropriate data sheet.

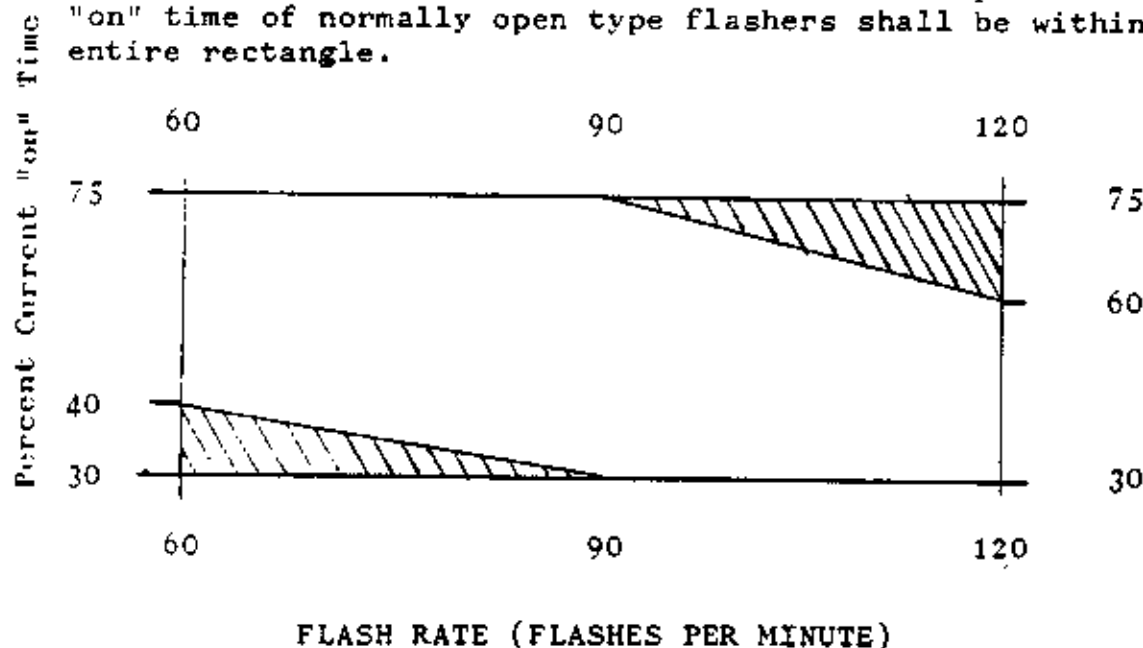
### Flash Rate and Percent Current "On" Time

Flash rate and percent current "on" time shall be measured after the flashers have been operating for five consecutive cycles, and shall be an average of three consecutive cycles. The flash rate and percent on time shall be determined over combinations of bulb voltages and ambient temperatures shown below:

<u>Voltage (<math>\pm 0.1v</math>)</u>	<u>Stabilized Ambient Temperature ( F )</u>
12.5 or 6.4	$75 \pm 10$
12.0 or 6.0	$0 \pm 5$
15.0 or 7.5	$0 \pm 5$
11.0 or 5.5	$125 \pm 5$
14.0 or 7.0	$125 \pm 5$

This test shall be conducted using the same circuitry and power supply as the starting time and voltage drop tests. Results of the test shall be recorded on the appropriate data sheet.

The flash rate and the percent current "on" time of normally closed type flashers shall be within the unshaded portion of the polygon shown below. The flash rate and percent current "on" time of normally open type flashers shall be within the entire rectangle.



At least 17 of the 20 units are required to meet the specified requirements.

#### Durability test

Twenty of the remaining sample flashers shall be selected which meet the starting time, voltage drop, percent "on" time and flash rate (at 12.8v and  $75 \pm 10F$ ) requirements listed above and shall be subjected to the durability test.

The durability test shall be conducted on each flasher with the design load for the turn signal system connected in a standard test circuit, and with the power source adjusted to apply 14 V or 7 V ( $\pm 0.1v$ ) according to the flasher rating to the input terminals of the standard test circuit.

Total time shall be 200 hours, with a cycle of operation of 15 seconds "on," 15 seconds "off." Ambient temperature during the test shall be  $75 \pm 10F$ .

During the test, the operation of the flashers shall be observed once every 24 hours and any failure shall be recorded by flasher number, elapsed time and nature of failure. A log shall be maintained showing that the daily observations were made.

At the conclusion of the durability test, each flasher shall be retested in the standard test circuit described for performance requirements of starting time, voltage drop, flash rate, and percentage "on" time (at 12.8V, and  $75 \pm 10F$ ).

Record the results of the durability test on the appropriate data sheet. At least 17 of the 20 units are required to meet the specified requirements.

#### Variable Load Turn Signal Flashers

Variable load turn signal flashers shall comply with voltage drop and durability requirements with the maximum design load connected and shall comply with starting time, flash rate, and percent current "on" time requirements both with the minimum and with the maximum design load connected.

#### Equipment

The power supply for the Performance Test shall comply with the following specifications:

(a) Output Voltage - Capable of supplying to the input terminals of the Standard Circuit 11 to 16 v d-c for 12 v flashers or 5 to 9 v d-c for 6 v flashers.

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(b) Output Current - Capable of supplying rated flasher current continuously and approximately 10 times rated flasher current for 50 milliseconds duration.

(c) Regulation

(1) Dynamic - The output voltage shall not deviate more than 1.0 v from 0 to maximum load (including transient) and shall recover 63 percent of its maximum excursion within 100 microseconds.

(2) Static - The output voltage shall not deviate more than two percent with changes in static load from zero to maximum (not including transient current).

(d) Ripple Voltage - Maximum 75 mv. peak to peak.

The power supply for the Endurance Test shall comply with the following specifications:

(a) Output Voltage - Capable of supplying 14 v d-c or 7 v d-c according to the flasher rating to the input terminals of the standard test circuit.

(b) Output Current - Capable of supplying a continuous output current of the rated load for one flasher times the number of flashers operating in the same "on" period of the Life Test. In addition, the power supply shall be capable of supplying a transient current of approximately 10 times the rated current for 1 flasher times the number of flashers started on their flashing cycle at the same instant.

(c) Regulation

(1) Dynamic - The output voltage shall not deviate more than 1.0 v from zero to maximum load (including transient current) and should recover 63 percent of its maximum excursion within five milliseconds.

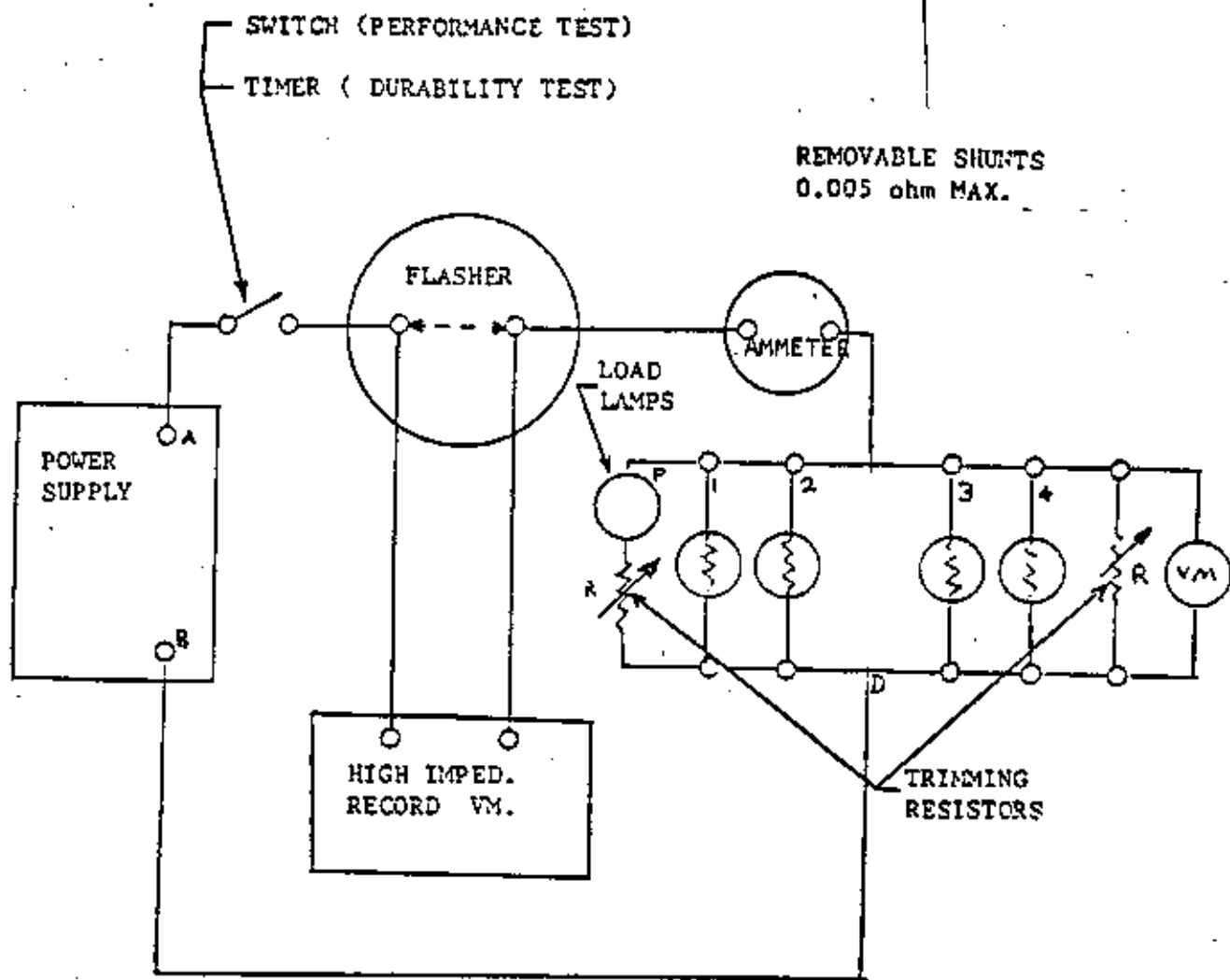
(2) Static - The output voltage shall not deviate more than two percent with changes in static load from zero to maximum (not including transient).

(d) Ripple Voltage - Maximum 300 mv. peak to peak.



The minimum equipment described below shall be utilized for measuring the test parameters:

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Temperature Chamber(s)	-10 to 150 F	$\pm 5$ F
Power Supply	0-16 volts DC	As described above
Recorder	Voltage as Required Frequency Greater than 10 Hertz	$\pm 10$ millivolts
Ammeter	0-20 amps DC	$\pm 0.5$ percent
Thermocouple and Recorder	-10 to 150 F	$\pm 1$ F
Timer	15 seconds "on" 15 seconds "off"	$\pm 3$ percent
Timer	0-250 hours	$\pm 1$ minute



NOTE: RESISTANCE LOOKING INTO TERMINALS  
A-B WITH THE REMOVABLE SHUNTS IN  
PLACE SHALL BE 0.10 ± 0.01 ohms

STANDARD TEST CIRCUIT FOR AUTOMOTIVE FLASHER

Figure 1

13. VEHICLE HAZARD WARNING SIGNAL  
OPERATING UNIT TEST  
PROCEDURE

Definition

Vehicle Hazard Warning Signal Operating Unit

A driver controlled device which causes all turn signals to flash simultaneously to indicate to the approaching drivers the presence of a vehicular hazard.

Physical Inspection

The device shall be physically inspected. Record all markings on the appropriate data sheet.

Durability Test

The vehicle hazard operating unit shall be tested at rated voltage with the maximum bulb load to be used on the vehicle. (NOTE: The flasher is not to be included in the circuit during the test.)

The unit should be turned "on" and "off" in the normal manner, at a rate between 12 and 15 CPM. The test sequence shall consist of:

10,000 cycles\* at a temperature of  $75 \pm 10^{\circ}\text{F}$

1 hour "ON" at a temperature of  $75 \pm 10^{\circ}\text{F}$

\*One cycle shall consist of "off" to "on" and back to "off."

The unit shall be operative at the completion of the test (except bulbs may be replaced during the period of the test) and the voltage drop from the input terminal to each output terminal (including 3 inches of No. 16 or 18 gage wire on each side of the switch) shall not exceed 0.3 volts with rated lamp load for either 6.4 or 12.8 line voltage before or after test. A combination switch shall meet all other applicable requirements for its function, in addition to the durability test.

### Equipment

The minimum equipment described below shall be utilized for measuring test parameters:

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Cycling Stand	12-15 CPM	N/A
Stop Watch	0-30 Minutes	$\pm$ 1 Second
Counter	0-10K Cycles	$\pm$ 1 count
Load Lamp	N/A	N/A
Ammeter	0-15 AMPS DC	$\pm$ 0.5 percent
Power Supply	6.4/12.8 Volts DC	$\pm$ 0.005 volts
Voltmeter	0-20 Volts DC	$\pm$ 0.05 percent
Millivoltmeter	0-500 Millivolts	$\pm$ 5.0 millivolts

#### 14. VEHICLE HAZARD WARNING SIGNAL FLASHER TEST PROCEDURE

##### Definition

##### Vehicle Hazard Warning Signal Flasher

A device which causes all the required signal lights to flash as long as it is turned on.

##### Physical Inspection

All devices shall be physically inspected. Record the external appearance and all markings.

##### Calibration of Standard Test Circuit

The standard test circuit is shown in Figure 1. Measure the circuit resistance at "A-B" with the flasher and bulb load shorted-out with a shunt resistance not to exceed 0.005 ohms. This resistance shall be  $0.10 \pm 0.01$  ohms.

Adjust the voltage at the bulbs to 12.8v (6.4V) as required for testing, at "C-D" with the flasher shorted out by an effective shunt resistance not to exceed 0.005 ohms. The load current shall be held to the rated value for the flasher minimum load within 0.5 percent at 12.8V (6.4V) by simultaneously adjusting trimmer resistor R. The power supply shall be adjusted to provide other required test voltages, at required temperatures, at "C-D," without readjustment of trimmer resistor. The required voltage tests with the maximum bulb load shall be conducted without readjusting each corresponding power supply voltage, previously set with minimum bulb load.

With a high impedance voltage recorder connected to points "X-Y" measure the data required for the tests. The measurement of these quantities shall not disturb the circuit.

##### Performance Tests

Twenty flashers shall be selected at random for the 50 submitted for tests. These 20 flashers shall be connected in a circuit as shown below oriented in the mounting position specified by the manufacturer. The maximum load imposed on the flasher shall be the sum of the design currents of all bulbs included in the hazard warning system. The minimum load shall be the sum of the design currents of two signal bulbs ( $\pm 0.5$  percent).

The voltage shall be adjusted to design voltage unless otherwise specified. The power source shall be as specified in the equipment section of this procedure.

#### Starting Time Test

Normally closed type flashers shall open (turn off) within 1.5 seconds. Normally open type flashers shall complete the first cycle (close the contacts and then open the contacts) within 1.5 seconds. The time measurement will start when the voltage is initially applied. The test shall be made in an ambient temperature of  $75 \pm 10^{\circ}\text{F}$  with minimum and maximum load connected.

Findings shall be based on an average of three starts, which shall be separated by a cooling interval of 5 minutes. Results of the test shall be recorded in the appropriate data sheet.

#### Voltage Drop Test

Voltage drop shall be measured between the input and load terminals during the "on" period. The test shall be conducted at an ambient temperature of  $75 \pm 10^{\circ}\text{F}$  with maximum load connected, and the power source for the test circuit adjusted to apply design voltage at the bulbs. After the flashers have completed a minimum of five consecutive cycles, the lowest voltage drop during three consecutive cycles shall be measured.

The lowest voltage drop across the flasher for three consecutive cycles shall not exceed 0.8 volts.

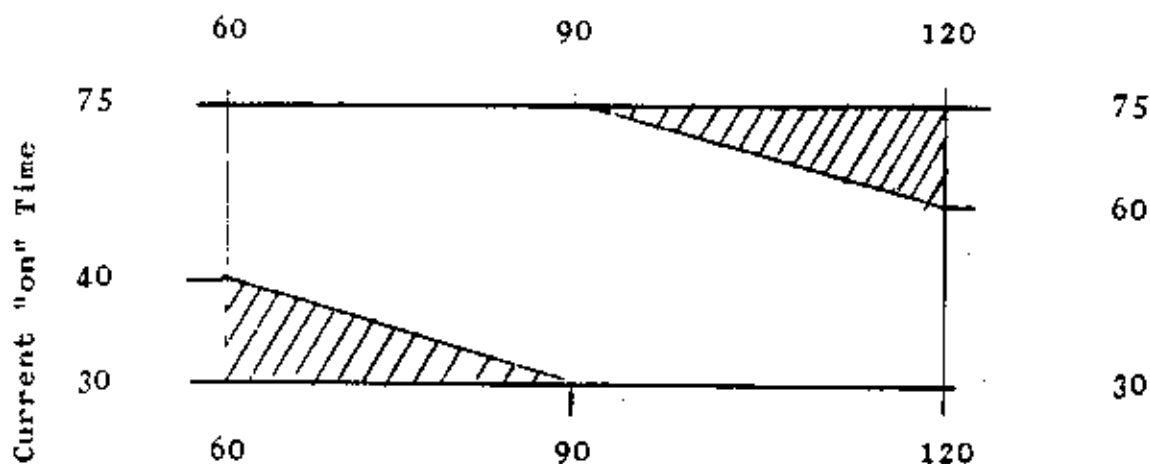
Results shall be recorded on the appropriate data sheet.

#### Flash Rate and Percent Current "on" Time

Flash rate and percent current "on" time shall be measured after the flashers have been operating for five consecutive cycles, and shall be an average of three consecutive cycles. The above operating parameters shall be determined over combinations of bulb voltage and ambient conditions shown below.

<u>Voltage (+ 0.1V)</u>	<u>Stabilized Ambient Temperature ( F )</u>
12.8 or 6.4	$75 \pm 10$
11.0 or 5.5	$0 \pm 5$
13.0 or 6.5	$0 \pm 5$
11.0 or 5.5	$125 \pm 5$
13.0 or 6.5	$125 \pm 5$

The 20 units will be tested for flash rate. The flash rate and the percent current "on" time of normally closed type flasher shall be within the unshaded portion of the polygon shown below. The flash rate and percent current "on" time of normally open type flashers shall be within the entire rectangle.



FLASH RATE (FLASHES PER MINUTE)

These requirements shall apply for loads of two signal lamps and the maximum design load, including pilot lamps.

At least 17 of 20 units tested shall meet the specified requirements.

### Durability Test

Twenty of the remaining 30 sample flashers which meet the starting time, voltage drop, percent "on" time and flash rate (at 12.8V or 6.4V and  $75 \pm 10$  F) requirements listed above shall be subjected to the durability test.

The durability test shall be conducted on each-flasher with the maximum design load for the signal system connected in a standard test circuit, and with the power source adjusted to apply 13V or 6.5V ( $\pm 0.1$ V) according to the flasher rating to the input terminals of the standard test circuit.

Total time shall be 36 hours. Ambient temperature during the test shall be  $75 \pm 10$ F.

During the test, the operation of the flashers shall be observed once every 24 hours and any failure shall be recorded by flasher number, elapsed time and nature of failure. A log shall be maintained, showing that the daily observations were made.

At the conclusion of the durability test, each flasher shall be tested in the standard test circuit with a minimum load equal to the rated current of two signal bulbs and with a load equal to the rated current of the maximum bulb load, including indicator bulbs, as specified by the manufacturer. The power source shall be adjusted to design voltage at the bulbs and the ambient temperature shall be  $75 \pm 10$ F. The flashers shall meet the requirements for starting time, voltage drop, percent "on" time and flash rate at 12.8 or 6.4 volts and  $75 \pm 10$ F.

Record the results of the durability test on the appropriate data sheet. At least 17 of the 20 units tested shall meet the specified requirements.

### Equipment

The power supply for the Performance Test shall comply with the following specifications:

(a) Output Voltage - Capable of supplying to the input terminals of the Standard Circuit 11 to 16 v d-c for 12 v flashers or 5 to 9 v d-c for 6 v flashers.

(b) Output Current - Capable of supplying rated flasher current continuously and approximately 10 times rated flasher current for 50 milliseconds duration.

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(c) Regulation

(1) Dynamic - The output voltage shall not deviate more than 1.0 v from 0 to maximum load (including transient) and shall recover 63 percent of its maximum excursion within 100 microseconds.

(2) Static - The output voltage shall not deviate more than two percent with changes in static load from zero to maximum (not including transient current).

(d) Ripple Voltage - Maximum 75 mv. peak to peak.

The power supply for the Durability Test shall comply with the following specifications:

(a) Output Voltage - Capable of supplying 13. v d-c or 6.5 v d-c, according to the flasher rating, to the input terminate of the standard testcircuit.

(b) Output Current - Capable of supplying a continuous output current of the rated load for one flasher times the number of flashers operating at the same "on" period of the Durability Test. In addition, the power supply shall be capable of supplying a transient current of approximately 10 times the rated current for 1 flasher times the number of flasher started on their flashing cycle at the same instant.

(c) Regulation

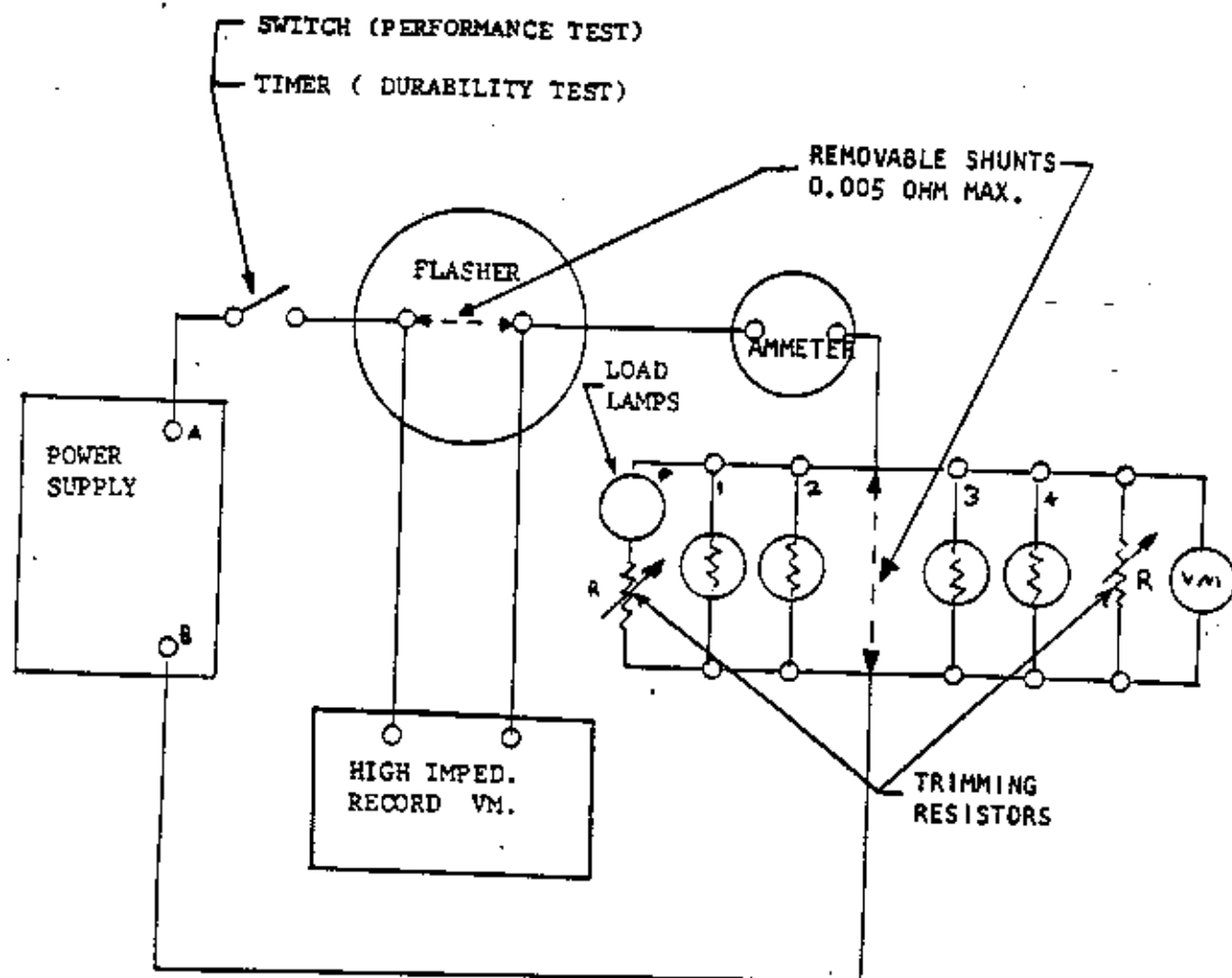
(1) Dynamic - The output voltage shall not deviate more than 1.0 v from zero to maximum load (including transient current) and should recover 63 percent of its maximum excursion within five milliseconds.

(2) Static - The output voltage shall not deviate more than two percent with changes in static load from zero to maximum (not including transient).

(d) Ripple Voltage - Maximum 300 mv. peak to peak.

The minimum equipment described below shall be utilized for measuring the test parameters:

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Power Supply	0-16 volts DC	As described above
Recorder	Voltage as Required - Frequency Greater Than 10 Hertz	+ 10 millivolts
Ammeter	0-20 amps DC	$\pm$ 0.5 percent
Thermocouple and Indicator	-50 to 250 F	$\pm$ 1 F
Timer	0-50 hours	$\pm$ 1 minute



NOTE: RESISTANCE LOOKING INTO TERMINALS  
A-B WITH THE REMOVABLE SHUNTS IN  
PLACE SHALL BE  $0.10 \pm 0.01$  ohms

THE LOAD FOR THE FLASHER SHALL BE  
WITHIN 0.5% AS SPECIFIED BY THE  
FLASHER MANUFACTURER

# STANDARD TEST CIRCUIT FOR AUTOMOTIVE FLASHER

Figure 1



SECTION C  
REPORT SUMMARY  
AND  
TEST DATA SHEETS



# 1. SEALED BEAM HEADLAMP UNIT TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ Number of Units Tested \_\_\_\_\_  
Bulb Type \_\_\_\_\_

## SUMMARY

The following is a summary of the results of tests performed in accordance with applicable requirements.

### TESTS

### RESULTS

#### Number Passed

#### Number Failed

Physical Inspection

Clarity of Hot Spot  
Definition

Visual Appraisal of Aim

Color Test

Photometric Test

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

# HALOGEN HEADLAMP UNIT TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
 Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
 Report Number \_\_\_\_\_ Number of Units Tested \_\_\_\_\_

## SUMMARY

The following is a summary of the results of the tests performed in accordance with applicable requirements:

### TESTS

### RESULTS

		<u>Number Passed</u>	<u>Number Failed</u>
Photometric Test	Upper Beam		
Photometric Test	Lower Beam		
Clarity of Hot Spot			
Color Test			
Physical Inspection	Dimensions and Angles		
Physical Inspection	Aiming Pads		
Physical Inspection	Hermetical Seal		
Physical Inspection	Wattage		
Physical Inspection	Other Factors		

\_\_\_\_\_  
 Signature of Responsible Laboratory Official

\_\_\_\_\_  
 Date

\_\_\_\_\_  
 Title

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Physical Inspection

Tests Performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

Manufacturer's name or trademark  
on lens \_\_\_\_\_

( )Y ( )N

Trade Number on Unit \_\_\_\_\_

( )Y ( )N

Voltage on Unit \_\_\_\_\_

( )Y ( )N

Height of Raised Letters \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_as necessary  
\_\_\_\_\_  
\_\_\_\_\_

Number of Units Less than 0.020 inch

( )Y ( )N

Dimension "A" \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_as necessary  
\_\_\_\_\_  
\_\_\_\_\_

Number within Limits \_\_\_\_\_

( )Y ( )N

Distance from Geometric Center  
to Electrical Contacts

Upper

Lower

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_as necessary  
\_\_\_\_\_  
\_\_\_\_\_

Number within 0.241 inch \_\_\_\_\_

( )Y ( )N

Dimension "B" Specification \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_as necessary  
\_\_\_\_\_  
\_\_\_\_\_

Number within Specifications \_\_\_\_\_

( )Y ( )N

Remarks \_\_\_\_\_

Date \_\_\_\_\_

# TEST DATA SHEET

Physical Inspection - Halogen Headlamp Unit

Type: \_\_\_\_\_ Size \_\_\_\_\_  
Beam(s) \_\_\_\_\_

Tests performed by \_\_\_\_\_

Manufacturer's name or trade mark on lens \_\_\_\_\_ ( ) Y ( ) N

Other markings on unit \_\_\_\_\_

Manufacturer's name on bulb \_\_\_\_\_

Other markings on bulb \_\_\_\_\_

Angles "B"		B1	B2	B3
Required	Measured	A _____	_____	_____
		B _____	_____	_____
C _____	D _____	E _____	F _____	_____

( ) Y ( ) N

Dimension between seating plane to mounting ring and inside of lamp housing. See SAE J571b of April 1965. Required minimum of 4.13 inch for 7 inch H4, 2.98 inch for 5 3/4 inch H4, and 2.98 inch for 5 3/4 H1. ( ) Y ( ) N

Unit is an integral and indivisible optical assembly ( ) Y ( ) N

Aiming pads are present on unit ( ) Y ( ) N

Unit is hermetically sealed ( ) Y ( ) N

Wattage satisfies requirements of S4.1.1.33 of FMVSS No. 108

Upper Beam	Required	_____		
	Actual	_____		
A _____	B _____	C _____	D _____	E _____

( ) Y ( ) N

Lower Beam	Required	_____		
	Actual	_____		
A _____	B _____	C _____	D _____	E _____

( ) Y ( ) N

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# Clarity of Hot Spot Definitions

## Type I - High Beam

Location of Geometric Center of the High Intensity Zone

No. 1	Vertical Location				Horizontal Location			
	Observations				Observations			
Observer	1	2	3	Average	1	2	3	Average
1	_____	_____	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____	_____	_____
<u>Max. Average</u>				<u>Min. Average</u>	<u>Max. Average</u>			
					<u>Min. Average</u>			

No. 2							
1	_____	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____	_____
<u>Max. Average</u>				<u>Min. Average</u>		<u>Max. Average</u>	
<u>Min. Average</u>				<u>Max. Average</u>		<u>Min. Average</u>	

As  
Necessary

Number

Maximum Vertical Deviation within 0.2 degree ( )Y ( )N  
Maximum Horizontal Deviation within 0.4 degree ( )Y ( )N

## Type II - Low Beam

Location of Top and Left Edge of High Intensity Zone

No. 1	Vertical				Horizontal				
Observer	Observations (Degrees Up or Down)				Observations (Degrees Left or Right)				
	1	2	3	Average	1	2	3	Average	
1	_____	_____	_____	_____	_____	_____	_____	_____	
2	_____	_____	_____	_____	_____	_____	_____	_____	
3	_____	_____	_____	_____	_____	_____	_____	_____	
<u>Maximum Average</u>				<u>Minimum Average</u>	<u>Maximum Average</u>				<u>Minimum Average</u>

Visual Appraisal of Aim

Tests performed by \_\_\_\_\_ Date \_\_\_\_\_

Observers \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Number

Average aim of headlamp within allowable  
tolerances.

( ) Y ( ) N

Remarks \_\_\_\_\_  
\_\_\_\_\_

Color Test

Tests performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

Color of sealed beam unit is white

( ) Y ( ) N

Reference Bulb control number \_\_\_\_\_

Photometric Test

Tests Performed By \_\_\_\_\_ Date \_\_\_\_\_

Number

Sealed Beam Units meet photometric values  
at each point

( ) Y ( ) N

Reference Bulb control number \_\_\_\_\_

Test Distance 60 feet \_\_\_\_\_

# PHOTOMETRIC READINGS FOR 7 INCH

## TYPE 1 SEALED BEAM UNITS

### UPPER BEAM DEVICE NUMBER

Test Point Degrees	1	2	3	(As necessary)	Max Cp	Min Cp
3U	3R					500
3U	3L					500
2U	3R					1000
2U	3L					1000
1U	3R					2000
1U	3L					2000
	12R					750
	9R					1500
	6R					3250
	3R					10,000
1/2D	V					20,000
	3L					10,000
	6L					3250
	9L					1500
	12L					750
	9R					1500
2D	V					5000
	9L					1500
	12R					750
3D	V					2500
	12L					750
4D	V				5000	

Voltage  
Amperes

Overall Max.

\*Denotes a Failure

Tests Performed By \_\_\_\_\_ Date \_\_\_\_\_

# PHOTOMETRIC READINGS FOR 7 INCH

## TYPE 2 SEALED BEAM UNITS

### LOWER BEAM DEVICE NUMBER

Lower Beam Test Points						Max Cp	Min Cp
Degrees	1	2	3	(As necessary)			
1U 1L						500	
1/2U 1L						800	
1/2D 1L						2,000	
1 1/2U 1R						1,000	
1/2U 1R						2,000	
1/2U 2R						2,000	
1/2U 3R						2,000	
1/2D 2R						15,000	6,000
1D 6L							1,000
1 1/2D 2R							15,000
1 1/2D 9R							1,000
1 1/2D 9L							1,000
2D 15R							700
2D 15L							700
4D 4R						12,500	
10U to 90U (a)						125	
Voltage Amperes							

(a) From the normally exposed surface of the lens

\* Denotes a failure

Test Performed By \_\_\_\_\_ Date \_\_\_\_\_

# PHOTOMETRIC READINGS FOR 5 3/4 INCH

## TYPE I SEALED BEAM UNITS

### UPPER BEAM DEVICE NUMBER

Test Point Degrees	1	2	3	(As necessary)	Max Cp	Min Cp
3U	3R					450
3U	3L					450
2U	3R					750
2U	3L					750
1U	3R					3,000
1U	3L					3,000
	V					750
	9R					2,000
	6R					3,000
	3R					12,000
1/2D	V				(a)	18,000
	3L					12,000
	6L					3,000
	9L					2,000
	12L					750
	9R					1,250
2D	V					3,000
	9L					1,250
	12R					600
3D	V					1,500
	12L					600
4D	V				2,500	

Voltage  
Amperes

(a) Combined maximum candlepower shall not exceed 37,500

\* Denotes a Failure

Test Performed by \_\_\_\_\_ Date \_\_\_\_\_



PHOTOMETRIC READINGS FOR 5 3/4 INCH

TYPE 2 SEALED BEAM UNITS

UPPER BEAM  
DEVICE NUMBER

Test Point Degrees	1	2	3	(As necessary)	Max Cp	Min Cp
3U	3R					300
3U	3L					300
2U	3R					750
2U	3L					750
1U	3R					2,000
1U	3L					2,000
	12R					750
	9R					1,000
	6R					2,000
	3R					3,000
1/2D	V				(a)	7,000
	3L					3,000
	6L					2,000
	9L					1,000
	12L					750
	9R					750
2D	V					2,000
	9L					750
	12R					400
3D	V					1,000
	12L					400
4D	V				2,500	

Voltage  
Amperes

(a) Combined maximum candlepower shall not exceed 37,500

\* Denotes a Failure

Test Performed By \_\_\_\_\_ Date \_\_\_\_\_

# PHOTOMETRIC READINGS FOR 5 3/4 INCH

## TYPE 2 SEALED BEAM UNITS

### LOWER BEAM DEVICE NUMBER

Test Point Degrees	1	2	3	(As necessary)	-Max Cp	Min Cp
1U 1L					500	
1/2U 1L					800	
1/2D 1L					2,000	
1 1/2U 1R					1,000	
1/2U 1R					2,000	
1/2U 2R					2,000	
1/2U 3R					2,000	
1/2D 2R					15,000	6,000
1D 6L						1,000
1 1/2D 2R						15,000
1 1/2D 9R						1,000
1 1/2D 9L						1,000
2D 15R						700
2D 15L						700
4D 4R					12,500	
10U to 90U(a)					125	

Voltage  
Amperes

(a) From normally exposed surface of the lens

\* Denotes a failure

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

## 2. SEALED BEAM HEADLAMPS TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ Number of Devices Tested \_\_\_\_\_

### SUMMARY

The following is a summary of the results of the tests performed in accordance with applicable specifications.

<u>Tests</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Photometric Test - Upper Beam		
Photometric Test - Lower Beam		
Photometric Test - Upper & Lower Beams Combined		
Wattage Test - Upper Beam		
Wattage Test - Lower Beam		

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

# TEST DATA SHEETS

Tests performed by \_\_\_\_\_ Date \_\_\_\_\_

Dimensions	a	b	c	d	e	f	Number
Dimension "B" Required within $\pm 1^\circ$	<u>70°</u>	<u>70°</u>	70°	70°	70°	70°	( )Y ( )N
Dimension "C" Required within $\pm 0^\circ 10'$	<u>130°</u>	130°	130°	130°	130°	130°	( )Y ( )N
Dimension "D" Required within $\pm 0^\circ 10'$	100°	100°	100°	100°	100°	100°	( )Y ( )N
Seating area free from burrs and prutrusions							( )Y ( )N
Seating area extends $1\frac{1}{2}''$ each side of lug							( )Y ( )N
Ease of gasket installation acceptable	( )N/A						( )Y ( )N
Headlamp or dummy flange secured by retaining ring							( )Y ( )N
Headlamp securely held after 25 replacement operations							( )Y ( )N

Remarks \_\_\_\_\_

## Connector Voltage Drop

Tests performed by \_\_\_\_\_ Date \_\_\_\_\_

	Number
Voltage drop at socket does not exceed to millivolts	( )Y ( )N
Actual voltage drop of test devices	

## DEVICE NUMBER

a	b	c	(As necessary)
---	---	---	----------------

Upper Beam

Lower Beam

Ground

Remarks \_\_\_\_\_

### Aiming Adjustment Test

Tests performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

	A	B	C	d	e	f
Horizontal	_____	_____	_____	_____	_____	_____
Vertical	_____	_____	_____	_____	_____	_____

Greater than  
4 degrees

( )Y ( )N

Withstands 50  
lb. force without  
receding into body  
or housing (if no  
enter value)

( )Y ( )N

Deviation at 25  
feet through 4  
degrees

Horizontal

Vertical

Horizontal and vertical  
less than 4"

( )Y ( )N

Self-locking Device  
Completed 10 adjustments  
(if no - enter number)

( )Y ( )N

Remarks \_\_\_\_\_

### Vibration Test

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

The devices completed test without evidence of  
material physical weakness or failure of parts  
which affects proper function.

( )Y ( )N

Remarks \_\_\_\_\_

Corrosion Test

Tests performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

The devices completed test without evidence of

Corrosion which affects proper function

(-) Y ( ) N

Remarks \_\_\_\_\_

Report No.

# PHOTOMETRIC TEST for TYPE 1A HEADLAMPS

Reference Tables I and III, FMVSS No. 108, SAE J579c 12/74

Test performed by:

Lamp devices meet photometric values at each test point:

Test Distance: 60 feet, minimum

Date:

Test Number:

Number

( )Y ( )N

Test Points Degrees	Type	Upper Beam	Candlepower	
	Device Number			
	DOT Test Number		Required	
			Minimum	Maximum
2U-V			750	
1U-3R			3000	
3L			3000	
12R			750	
9R			2000	
6R			3000	
3R			12000	
8-V			18000	60000
3L			12000	
6L			3000	
9L			2000	
12L			750	
9R			1250	
1-1/2D-V			3000	
9L			1250	
12R			600	
2-1/2D-V			1500	
12L			600	
4D-V				5000
Maximum Location				
Volts:				
Amperes:				

Combined maximum candela for one Type 1A and one Type 2A headlamp at any test point shall not exceed 75,000

Report No.

PHOTOMETRIC TEST for TYPE 2A1 HEADLAMPS  
Reference Tables I and III FMVSS No. 108, SAE J579c 12/74

Test performed by:

Date:

Test Number:

Lamp devices meet photometric values at each test point:

Number

Test Distance: 60 feet, minimum

( )Y ( )N

Test Points Degrees	Type	Upper Beam	Candlepower	
	Device Number			
	DOT Test Number		Required	
			Minimum	Maximum
2U-V			750	
1U-3R			2000	
3L			2000	
12R			750	
9R			1000	
6R			2000	
3R			3000	
H-V			7000	15000
3L			3000	
6L			2000	
9L			1000	
12L			750	
9R			750	
1-1/2D-V			2000	
9L			750	
12R			400	
2-1/2D-V			1000	
12L			400	
4D-V				2500
Maximum Location				
Volts:				
Amperes:				

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Combined maximum candela for one Type 1A and one Type 2A headlamp at any test point shall not exceed 75,000



Report No.

PHOTOMETRIC TEST for TYPE 2A, 2B, 2C, 2D and 2E HEADLAMPS

Reference Tables I and III FMVSS No. 108, SAE J579c 12/74

Date:

Test performed by:

Test Number:

Lamp devices meet photometric values at each test point:

Number

Test Distance: 60 feet, minimum

( )Y ( )N

Test Points Degrees	Type	Lower Beam	Candlepower	
	Device Number			
	DOT Test Number		Required	
			Minimum	Maximum
1-1/2U-1R to R				1400
1U-1-1/2L to L				700
1/2U-1R to 3R				2700
1-1/2L to L				1000
1/2D-1-1/2L to L				2500
1-1/2R			8000	20000
1D-6L			750	
1-1/2D-2R			15000	
9R			750	
9L			750	
2D-15R			700	
15L			700	
4D-4R				12500
10U to 90U				125
Maximum Location				
Volts:				
Amperes:				

Maximum candela at any test point shall not exceed 75,000

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Report No.

PHOTOMETRIC TEST for TYPE 2A, 2B, 2C, 2D and 2E HEADLAMPS  
Reference Tables I and III FMVSS No. 108, SAE J579c 12/74

Test performed by:

Lamp devices meet photometric values at each test point:

Test Distance: 60 feet, minimum

Date:

Test Number:

Number

( )Y ( )N

Test Points Degrees	Type	Upper Beam		
	Candlepower			
	Device Number			
	DOT Test Number			
			Required Minimum	Maximum
2U-V			1000	
1U-3R			2000	
3L			2000	
12R			750	
9R			1500	
6R			3250	
3R			10000	
H-V			20000	75000
3L			10000	
6L			3250	
9L			1500	
12L			750	
9R			1500	
1-1/2D-V			5000	
9L			1500	
12R			750	
2-1/2D-V			2500	
12L			750	
4D-V				5000
Maximum Location				
Volts:				
Amperes:				

Maximum candels at any test point shall not exceed 75,000

### 3. TAIL LAMP TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ Number of Devices Tested \_\_\_\_\_  
Bulb Designation \_\_\_\_\_

#### SUMMARY

<u>Tests</u>	<u>Results</u>
	<u>Number Passed</u> <u>Number Failed</u>
Physical Inspection	
Photometric Test	
Color Test	
Dust Test	
Moisture Test	
Corrosion Test	
Vibration Test	

\_\_\_\_\_  
Signature of Responsible Laboratory Official      Date

\_\_\_\_\_  
Title

## TEST DATA SHEETS

### Physical Inspection

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Markings \_\_\_\_\_

Method of mounting to vehicle \_\_\_\_\_

Type of material from which lens is made \_\_\_\_\_

Markings on lens \_\_\_\_\_

### Projected Illuminated Area Determination

Unobstructed illuminated area of lens (at degrees) \_\_\_\_\_

Method of determination \_\_\_\_\_

Bulb(s) Designation \_\_\_\_\_

Bulb Socket Type    (    )A-1    (    )B-1    (    )B-2    (    )C-2

Number

Bulb Socket accepts "Go" Gauge and rejects "No Go"

Gauge (    ) Y (    ) N

Dimension A does not exceed maximum (    ) Y (    ) N

Dimension B is not less than minimum (    ) Y (    ) N

Minimum Plug Gage retained by J-Slot (    ) Y (    ) N

Remarks \_\_\_\_\_

# PHOTOMETRIC TEST TAILLAMPS - ONE COMPARTMENT

Photometric (Test distance: 100 feet)  
(Bulb Trade No.)

<u>Test Points</u>	<u>Measured</u>	<u>Specified Minimum</u>
10°U-5°L		0.4
5°R		0.4
20°L		0.3
10°L		0.8
5°U-V		1.8
10°R		0.8
20°R		0.3
10°L		0.8
5°L		2.0
Hor.-V		2.0
5°R		2.0
10°R		0.8
20°L		0.3
10°L		0.8
5°D-V		1.8
10°R		0.8
20°R		0.3
10°D-5°L		0.4
5°R		0.4

Specified Maximum  
18  
Horizontal  
and above

Maximum:  
Location:

Bulbs operated at rated mean spherical candlepower.

Volts:

Amperes:

See Standard Notes 1 and 3

### CORROSION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

The device completed test without evidence of Corrosion.

which impairs proper functioning of the devices ( ) Y ( ) N

Necessary to rephotometer test ( ) Y ( ) N

Additional photometric data sheet added to report ( ) Y ( ) N

Remarks \_\_\_\_\_

### DUST TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

At completion of test, the maximum Candlepower

Readings of the Devices were within 10% of those

prior to Dust Test. ( ) Y ( ) N

Necessary to rephotometer test ( ) Y ( ) N

Additional photometric data sheet added to report ( ) Y ( ) N

Remarks \_\_\_\_\_

### MOISTURE TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

Devices accumulated less than 2cc of Moisture ( ) Y ( ) N

Remarks \_\_\_\_\_

### COLOR TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_  
Number \_\_\_\_\_  
Color of device is red \_\_\_\_\_ ( ) Y ( ) N  
Reference Bulb control number \_\_\_\_\_  
Remarks \_\_\_\_\_  
\_\_\_\_\_

### VIBRATION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_  
Number \_\_\_\_\_  
The devices completed test without evidence  
of material physical weakness of failure of parts  
which affects proper function ( ) Y ( ) N  
There was no evidence of lens or reflector  
rotation which affects proper function ( ) Y ( ) N  
Necessary to rephotometer test ( ) Y ( ) N  
Additional photometric data sheet added to report ( ) Y ( ) N  
Remarks \_\_\_\_\_  
\_\_\_\_\_

#### 4. STOP LAMP TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ Number of Devices Tested \_\_\_\_\_  
Bulb Designation \_\_\_\_\_

#### SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Physical Inspection		
Photometric Test		
Color Test		
Dust Test		
Moisture Test		
Corrosion Test		
Vibration Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title



## TEST DATA SHEETS

### Physical Inspection

Marking on housing \_\_\_\_\_

Marking on lens \_\_\_\_\_

Method of mounting on vehicle \_\_\_\_\_

Type of material from which lens is made \_\_\_\_\_

### Projected Illuminated Area Determination

Unobstructed Projected Illuminated area of lens \_\_\_\_\_

Effective Projected Illuminated area \_\_\_\_\_

Method of determination \_\_\_\_\_

Bulb(s) Type and Trade Number \_\_\_\_\_

Bulb Socket Type      ( ) A-1      ( ) B-1      ( ) B-2      ( ) C-2

Number

Bulb Socket accepts "go" Gauge and rejects "No Go" Gage      ( ) Y ( ) N

Dimension A does not exceed maximum      ( ) Y ( ) N

Dimension B is not less than minimum      ( ) Y ( ) N

Minimum Plug gage retained by J-Slot      ( ) Y ( ) N

Remarks \_\_\_\_\_

# PHOTOMETRIC TEST - STOP LAMPS

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Calibrated Bulb(s) Laboratory control number \_\_\_\_\_

Rated Mean Spherical Candlepower \_\_\_\_\_

Lamp devices met photometric values at each point ( ) Y ( ) N

Test distance 100 feet

## ONE COMPARTMENT

<u>Test Points</u>	<u>Measured</u>	<u>Specified Minimum</u>
10°D-5°L		16
5°R		16
20°L		10
10°L		30
5°D-V		70
10°R		30
20°R		10
10°L		40
5 L		80
Hor.-V		80
5°R		80
10°R		40
20°L		10
10°L		30
5°D-V		70
10°R		30
20°R		10
10°D-5°L		16
5°R		16

Specified Maximum  
300

Maximum:

Location:

Bulbs operated at rated mean spherical candlepower.

Volts:

Amperes:

\* Denotes a failure

Remarks \_\_\_\_\_

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See Standard Notes 1 and 3

### COLOR TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

	Number
Color of device is red	( ) Y ( ) N
Reference Bulb control number	( ) Y ( ) N
Remarks _____	

### VIBRATION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

	Number
The devices completed vibration test without evidence of material physical weakness of failure of parts which affects proper function	( ) Y ( ) N
There was no evidence of lens or reflector rotation which affects proper function	( ) Y ( ) N
Necessary to rephotometer test	( ) Y ( ) N
Additional photometric data sheet added to report	( ) Y ( ) N
Remarks _____	

### CORROSION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

	Number
The device completed the test without evidence of corrosion which impairs proper functioning of the devices	( ) Y ( ) N
Necessary to rephotometer test	( ) Y ( ) N
Additional photometric data sheet added to report	( ) Y ( ) N
Remarks _____	

### DUST TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

At completion of test, the maximum candlepower readings of the devices were within 10% of those prior to test	( ) Y ( ) N
Necessary to rephotometer test	( ) Y ( ) N
Additional photometric data sheet added to report	( ) Y ( ) N

Remarks \_\_\_\_\_

### MOISTURE TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

Device accumulated less than 2cc of Moisture	( ) Y ( ) N
--	-------------

Remarks \_\_\_\_\_

### 5. LICENSE PLATE LAMP TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ Number of Devices Tested \_\_\_\_\_  
Bulb Designation \_\_\_\_\_

#### SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Physical Inspection		
Photometric Test		
Color Test		
Dust Test		
Moisture Test		
Corrosion Test		
Vibration Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

# TEST DATA SHEETS

## Physical Inspection

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Markings on housing \_\_\_\_\_

Marking on lens \_\_\_\_\_

Method of mounting to vehicle \_\_\_\_\_

Angle of incident light to plate \_\_\_\_\_

Type of material from which lens is made \_\_\_\_\_

Bulb(s) designation \_\_\_\_\_

Bulb Socket Type                      (   )A-1      (   )B-1      (   )B-2      (   )C-2

Number

Bulb Socket accepts "Go" Gauge and rejects "No Go" gage      (   ) Y (   ) N

Dimension A does not exceed maximum                                      (   ) Y (   ) N

Dimension B is not less than minimum                                      (   ) Y (   ) N

Minimum Plug gage retained by J-Slot                                      (   ) Y (   ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

# PHOTOMETRIC TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Calibrated Bulb(s) laboratory control number \_\_\_\_\_

Rated mean Spherical Candlepower \_\_\_\_\_

Lamp Devices meet photometric values at each point Number  
( ) Y ( ) N

Test Distance \_\_\_\_\_

## DEVICE NUMBER

Test Station	a	b	c	(As necessary)
1				
2				
3				
4				
5				
6				
7				
8				
Voltage				
Amperes				

Illumination shall be at least .75 Ftc at each station.

The ratio of maximum to minimum shall not exceed 20 to 1.

\* Denotes a Failure

Remarks \_\_\_\_\_

### CORROSION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

The devices completed the test without evidence of Corrosion  
which impairs proper functioning of the devices ( ) Y ( ) N  
Necessary to rephotometer ( ) Y ( ) N  
Additional photometric data sheet added to report ( ) Y ( ) N

Remarks \_\_\_\_\_

### DUST TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

At completion of test, the maximum candlepower  
readings of the devices were within 10% of those  
prior to Dust Test. ( ) Y ( ) N  
Necessary to rephotometer ( ) Y ( ) N  
Additional photometric data sheet added to report ( ) Y ( ) N

Remarks \_\_\_\_\_

### MOISTURE TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

Devices accumulated less than 2cc of Moisture ( ) Y ( ) N

Remarks \_\_\_\_\_



### COLOR TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

Color of device is white

( ) Y ( ) N

Reference Bulb control number \_\_\_\_\_

Remarks \_\_\_\_\_

### VIBRATION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

The devices completed vibration test without evidence

of material physical weakness or failure of parts  
which affects proper function

( ) Y ( ) N

There was no evidence of lens or reflector rotation  
which affects proper function

( ) Y ( ) N

Necessary to rephotometer

( ) Y ( ) N

Additional Photometric data sheet added to Report

( ) Y ( ) N

Remarks \_\_\_\_\_

## 6. REFLEX REFLECTOR TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ Number of Devices Tested \_\_\_\_\_  
Color \_\_\_\_\_

### SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Physical Inspection		
Photometric Test		
Color Test		
Dust Test		
Moisture Test		
Corrosion Test		
Vibration Test		

Signature of Responsible Laboratory Official \_\_\_\_\_ Date \_\_\_\_\_

Title \_\_\_\_\_

### Physical Inspection

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Type of material from which the Reflex is made \_\_\_\_\_

Markings on device \_\_\_\_\_

Remarks \_\_\_\_\_

### Photometric Test

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Test distance \_\_\_\_\_

Reflex Reflectors meet photometric values at each specified angle

( ) Y ( ) N

### DEVICE NUMBER

Observation Angle	Entrance Angle					Red	Yellow
		a	b	c	(As necessary)	Minimum CP	Minimum CP
.02	0					4.5	11.25
	10U					3.0	7.5
	10D					3.0	7.5
	20L					1.5	3.75
	20R					1.5	3.75
1.5	0					.07	0.17
	10U					.05	0.12
	10D					.05	0.12
	20L					.03	0.075
	20R					.03	0.075

\* Denotes a failure

Remarks \_\_\_\_\_

### CORROSION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

The device completed test without evidence of Corrosion

which impairs proper functioning of the devices ☒ Y ☐ N

Necessary to rephotometer test ☐ Y ☐ N

Additional photometric data sheet added to report ☐ Y ☐ N

Remarks \_\_\_\_\_

### DUST TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

At completion of test, the maximum Candlepower

Readings of the Devices were within 10% of those

prior to Dust Test. ☐ Y ☐ N

Necessary to rephotometer test ☐ Y ☐ N

Additional photometric data sheet added to report ☐ Y ☐ N

Remarks \_\_\_\_\_

### MOISTURE TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

Devices accumulated less than 2cc of Moisture ☐ Y ☐ N

Remarks \_\_\_\_\_

### COLOR TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_  
Color of device is red or yellow ( ) Y ( ) N  
Reference Bulb control number \_\_\_\_\_  
Remarks \_\_\_\_\_

### VIBRATION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_  
The devices completed Vibration Test without  
evidence of material physical weakness of  
failure of parts which affects proper function. ( ) Y ( ) N  
There was no evidence of lens or reflector  
rotation which affects proper function. ( ) Y ( ) N  
Necessary to rephotometer ( ) Y ( ) N  
Additional photometric data sheet added  
to report. ( ) Y ( ) N  
Remarks \_\_\_\_\_  
\_\_\_\_\_

## 7. SIDE MARKER LAMP TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ Number of Devices Tested \_\_\_\_\_  
Bulb Type (s) \_\_\_\_\_

### SUMMARY

#### Test

#### Results

Number Passed Number Failed

Physical Inspection

Photometric Test

Color Test

Dust Test

Moisture Test

Corrosion Test

Vibration Test

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

## TEST DATA SHEETS

### Physical Inspection

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Markings on housing \_\_\_\_\_

Marking on lens \_\_\_\_\_

Method of mounting to vehicle \_\_\_\_\_

Type of material from which lens is made \_\_\_\_\_

Bulb(s) type \_\_\_\_\_

Bulb Socket type      ☐ W-2   ☐ A-1   ☐ B-1   ☐ B-2   ☐ C-2

Number

Bulb Socket accepts "Go" Gauge and rejects "No Go" Gauge      ☐ Y   ☐ N

Dimension A does not exceed maximum      ☐ Y   ☐ N

Dimension B is not less than minimum      ☐ Y   ☐ N

Minimum plug gage retained by J-Slot      ☐ Y   ☐ N

Remarks \_\_\_\_\_

PHOTOMETRIC TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Calibrated Bulb(s) Laboratory control number \_\_\_\_\_

Rated Mean Spherical Candlepower \_\_\_\_\_

Lamp devices meet photometric values at each point ( ) Y ( ) N

Test distance \_\_\_\_\_

DEVICE NUMBER

Test Points Degrees	DEVICE NUMBER				Min. C. P.	
	a	b	c	(As necessary)	Red	Amber
10U	45L				.25	.62
	V				.25	.62
	45 R				.25	.62
	45 L				.25	.62
	30 L					
	20 L					
H	10 L					.62
	V				.25	.62
	10 R					
	20 R					
	30 R					
	45 R				.25	.62
10D	45 L				.25	.62
	V				.25	.62
	45 R				.25	.62

Voltage  
Amperes

\* Denotes a Failure

Remarks \_\_\_\_\_



10

10

Number

$$\{ \} \quad Y \quad \{ \} \quad N$$
$$(\quad) Y (\quad)^{-} N$$

( ) Y ( ) N

Remarks \_\_\_\_\_

10

10

Number

( ) Y ( ) N

( ) Y ( ) N

( ) Y ( ) N

Remarks \_\_\_\_\_

10

10

Number

( ) Y ( ) N

Remarks \_\_\_\_\_

### COLOR TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Color of device is red or yellow

Number  
( ) Y ( ) N

Reference Bulb control number \_\_\_\_\_

Remarks \_\_\_\_\_

### VIBRATION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The devices completed Vibration Test without  
evidence of material physical weakness of  
failure of parts which affects proper function.

Number  
( ) Y ( ) N

There was no evidence of lens or reflector  
rotation which affects proper function.

( ) Y ( ) N

Necessary to rephotometer

( ) Y ( ) N

Additional photometric data sheet added  
to report.

( ) Y ( ) N

Remarks \_\_\_\_\_

### 8. PARKING LAMP TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_

Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_

Report No. \_\_\_\_\_ No. of Devices Tested \_\_\_\_\_

#### SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Physical Inspection		
Photometric Test		
Color Test		
Vibration Test		
Corrosion Test		
Dust Test		
Moisture Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

TEST DATA SHEETS  
PHYSICAL INSPECTION

Markings on housing \_\_\_\_\_

Markings on lens \_\_\_\_\_

Method of mounting to vehicle \_\_\_\_\_

Type of material from which housing is made \_\_\_\_\_

Type of material from which lens is made \_\_\_\_\_

Bulb(s) Type and Trade Number \_\_\_\_\_

Bulb socket type    ☐ A-1    ☐ B-1    ☐ B-2    ☐ C-2

Bulb socket accepts "Go" gauge and	Number
Rejects "No Go" Gage	<input type="checkbox"/> Y <input type="checkbox"/> N

Dimension A does not exceed maximum	<input type="checkbox"/> Y <input type="checkbox"/> N
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Dimension B is not less than minimum	<input type="checkbox"/> Y <input type="checkbox"/> N
--------------------------------------	---

Minimum Plug gage retained by J-slot	<input type="checkbox"/> Y <input type="checkbox"/> N
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Remarks \_\_\_\_\_

# PHOTOMETRIC TEST - PARKING LAMPS

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Calibrated Bulb(s) Laboratory Control Number \_\_\_\_\_

Rated mean spherical candlepower \_\_\_\_\_

Lamp devices meet photometric values at each point

( ) Y ( ) N

Test Distance \_\_\_\_\_

Photometric (Test distance: 100 feet)  
(Bulb Trade No.)

Test Points	Candlepower Parking Lamp	
	Measured	Specified Min. Max.
10°D-5°L		0.8 125
5°R		0.8 125
20°L		0.4 125
10°L		0.8 125
5°D-V		2.8 125
10°R		0.8 125
20°R		0.4 125
10°L		1.4 125
5°L		3.6 125
Bor.-V		4.0 125
5°R		3.6 125
10°R		1.4 125
20°L		0.4 250
10°L		0.8 250
5°D-V		2.8 250
10°R		0.8 250
20°R		0.4 250
10°D-5°L		0.8 250
5°R		0.8 250

Maximum:  
Location:

Bulbs operated at rated mean spherical candlepower.

Volts:

Amperes:

\*Not flashing during test

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### CORROSION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The devices completed the test without evidence of excess Corrosion which could impair proper functioning of the Devices.

Number  
( ) Y ( ) N

Necessary to rephotometer test

( ) Y ( ) N

Additional photometric data sheet added to report

( ) Y ( ) N

Remarks \_\_\_\_\_

### DUST TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

At completion of test, the maximum candle-power readings of the devices were within 10% of those prior to Dust Test

Number  
( ) Y ( ) N

Necessary to rephotometer test

( ) Y ( ) N

Additional photometric data sheet added to report

( ) Y ( ) N

Remarks \_\_\_\_\_

### MOISTURE TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Devices accumulated less than 2 cc. of Moisture

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

### COLOR TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Color of device is amber or white ☐ Y ☐ N

Reference bulb control number \_\_\_\_\_

Remarks \_\_\_\_\_

### VIBRATION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The devices completed Vibration Test without  
evidence of material physical weakness or failure  
of parts which affects proper function. ☐ Y ☐ N

There is no evidence of lens or reflector  
rotation which affects proper function. ☐ Y ☐ N

Necessary to rephotometer test ☐ Y ☐ N

Additional photometric data sheet to be  
added to report ☐ Y ☐ N

Remarks \_\_\_\_\_

9. BACKUP LAMP TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ No. of Devices Tested \_\_\_\_\_  
Bulb Type(s) \_\_\_\_\_

SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Physical Inspection		
Photometric Test		
Color Test		
Dust Test		
Moisture Test		
Corrosion Test		
Vibration Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title



TEST DATA SHEETS

PHYSICAL INSPECTION

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Marking on housing \_\_\_\_\_

Marking on lens \_\_\_\_\_

Method of mounting to vehicle \_\_\_\_\_

Type of material from which lens is made \_\_\_\_\_

Bulb(s) type and trade number \_\_\_\_\_

Bulb Socket Type    ( ) A-1    ( ) B-1    ( ) B-2    ( ) C-2

Bulb socket accepts "Go" gauge and rejects	Number
"no Go" Gage	( ) Y    ( ) N

Dimension A does not exceed maximum	( ) Y    ( ) N
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Dimension B is not less than minimum	( ) Y    ( ) N
--------------------------------------	----------------

Minimum plug gage retained by J-slot	( ) Y    ( ) N
--------------------------------------	----------------

Remarks \_\_\_\_\_

**PHOTOMETRIC TEST**  
(one lamp system)

Test Performed By \_\_\_\_\_ Date \_\_\_\_\_  
 Calibrated Bulb(s) Laboratory Control Number \_\_\_\_\_  
 Rated mean spherical candlepower \_\_\_\_\_  
 Lamp devices meet photometric values at each point ( ) Y ( ) N  
 Test Distance \_\_\_\_\_

Test Points		DEVICE NUMBER			Max. CP	Min. CP
Degrees		a	b	c (As necessary)		
10U	10R				300	20
	V				300	30
	10				300	20
5U	45R				300	30
	10R				300	40
	V				300	50
	10L				300	40
	45L				300	30
	45R				300	30
H	30R				300	50
	10R				300	100
	V				300	160
	10L				300	100
	30L				300	50
	45L				300	30
5D	45R				-	30
	30R				-	50
	10R				-	100
	V				-	160
	10L				-	100
	30L				-	50
	45L				-	30

Voltage \_\_\_\_\_  
 Amperes \_\_\_\_\_  
 Maximum (H and above) \_\_\_\_\_  
 Location \_\_\_\_\_

\*Denotes a failure

Remarks \_\_\_\_\_  
 \_\_\_\_\_

Test Performed By \_\_\_\_\_ Date \_\_\_\_\_

Calibrated Bulb(s) Laboratory Control Number \_\_\_\_\_

Rated mean spherical candlepower \_\_\_\_\_

Lamp devices meet photometric values at each point ( ) Y ( ) N

Test Distance \_\_\_\_\_

Test Points Degrees	DEVICE NUMBER			Max. CP	Min. CP*
	a	b	c (As necessary)		
10U	10R			300	10
	V			300	15
	10			300	10
5U	45R			300	15
	10R			300	20
	V			300	25
	10L			300	20
	45L			300	15
H	45R			300	15
	30R			300	25
	10R			300	50
	V			300	80
	10L			300	50
	30L			300	25
	45L			300	15
5D	45R			-	15
	30R			-	25
	10R			-	50
	V			-	80
	10L			-	50
	30L			-	25
	45L			-	15
				-	
				-	

Voltage  
Amperes  
Maximum (H and above)  
Location

\*Denotes a failure

Remarks \_\_\_\_\_

Note: For assymetrical lamps, the sum of the individual values readings will be recorded and compared to twice the candle-power requirements.

### CORROSION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The devices completed the test without evidence of excess corrosion which could impair proper functioning of the devices.

( ) Y ( ) N

Necessary to rephotometer test

( ) Y ( ) N

Additional photometric data sheet added to report

( ) Y ( ) N

Remarks \_\_\_\_\_

### DUST TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

At completion of test, the maximum candle-power readings of the devices were within 10% of those prior to dust test

( ) Y ( ) N

Necessary to rephotometer test

( ) Y ( ) N

Additional photometric data sheet added to report

( ) Y ( ) N

Remarks \_\_\_\_\_

### MOISTURE TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Devices accumulated less than 2 cc. of Moisture

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

### COLOR TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number \_\_\_\_\_

Color of device is red \_\_\_\_\_ ( ) Y ( ) N

Reference Bulb control number \_\_\_\_\_

Remarks \_\_\_\_\_

### VIBRATION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number \_\_\_\_\_

The devices completed test without evidence

of material physical weakness of failure of parts  
which affects proper function

( ) Y ( ) N

There was no evidence of lens or reflector

rotation which affects proper function

( ) Y ( ) N

Necessary to rephotometer test

( ) Y ( ) N

Additional photometric data sheet added to report

( ) Y ( ) N

Remarks \_\_\_\_\_

10. TURN SIGNAL LAMP TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ No. of Devices Tested \_\_\_\_\_

SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Physical Inspection		
Photometric Test		
Color Test		
Dust Test		
Moisture Test		
Corrosion Test		
Vibration Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

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### Physical Inspection

Tests performed by \_\_\_\_\_ Date \_\_\_\_\_

Marking on lens \_\_\_\_\_

Marking on housing \_\_\_\_\_

Method of mounting to vehicle \_\_\_\_\_

Type of material from which lens is made \_\_\_\_\_

### Projected Illuminated Area Determination

Effective projected illuminated area of lens \_\_\_\_\_

Unobstructed illuminated area of lens\_\_\_\_\_

Method of determination \_\_\_\_\_

Bulb(s) type and trade number \_\_\_\_\_

Bulb socket type      ☐ A-1    ☐ B-1    ☐ B-2    ☐ C-2

Bulb socket accepts "Go" gauge and rejects "No Go" gage ( ) Y ( ) N

Dimension A does not exceed maximum ☐ Y ☐ N

Dimension B is not less than minimum ☐ Y ☐ N

Minimum plug gage retained by J-slot ( ) Y ( ) N

Remarks \_\_\_\_\_

# PHOTOMETRIC TEST - TURN SIGNAL

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Calibrated Bulb(s) Laboratory control number \_\_\_\_\_

Rated mean spherical candlepower \_\_\_\_\_

Lamp Devices meet photometric values at each point Number  
( ) Y ( ) N

Test Distance \_\_\_\_\_

## Rear Turn Signal - Candlepower - One Compartment

Test Points	-cp Filament	Specified Minimum	Specified Minimum
		*Red	*Yellow
10°U-5°L		16	26
5°R		16	26
20°L		10	16
10°L		30	49
5°U-V		70	114
10°R		30	49
20°R		10	16
10°L		40	65
5°L		80	130
Hor.-V		80	130
5°R		80	130
10°R		40	65
20°L		10	16
10°L		30	49
5°D-V		70	114
10°R		30	49
20°R		10	16
10°D-5°L		16	26
5°R		16	26
		Specified Maximum	Specified Maximum
		300	750

Maximum:  
Location:

Bulbs operated at rated mean spherical candlepower.  
Volts:  
Amperes:

\*Not flashing during test  
See standard Note  
150

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# PHOTOMETRIC TEST - FRONT TURN SIGNAL/PARKING LAMPS

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Calibrated Bulb(s) Laboratory Control Number \_\_\_\_\_

Rated mean spherical candl power \_\_\_\_\_

Test Distance \_\_\_\_\_

Test Points	Candlepower		Minimum Ratios 3 Times 5 Times	
	Specified Minimum Yellow	Specified Min. Parking Lamp		
10°U-5°L	40	0.8		
5°R	40	0.8		
20°L	25	0.4		
10°L	75	0.8		
5°U-V	175	2.8		
10°R	75	0.8		
20°R	25	0.4		
10°L	100	1.4		
5°L	200	3.6		
Hor.-V	200	4.0		
5°R	200	3.6		
10°R	100	1.4		
20°L	25	0.4		
10°L	75	0.8		
5°D-V	175	2.8		
10°R	75	0.8		
20°R	25	0.4		
10°D-5°L	40	0.8		
5°R	40	0.8		

Maximum:  
Location:

Not flashing during test  
See Standard Note 1

\*The specified minimum values are for a turn signal lamp whose filament center is mounted farther than 4 inches from the lighted edge of the lower beam headlamps.

# PHOTOMETRIC TEST - COMBINED STOP/TAILLAMPS

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Calibrated Bulb(s) Laboratory Control Number \_\_\_\_\_

Rated mean spherical candlepower \_\_\_\_\_

Test Distance 100 feet Number of Compartments \_\_\_\_\_

Test Points	CANDLEPOWER				Minimum Ratios	
	Stop Lamp		Tail Lamp			
	Measured	Specified Minimum	Measured	Specified Minimum	3X	5X
10°U-5°L		16		0.4		
5°R		16		0.4		
20°L		10		0.3		
10°L		30		0.8		
5U-V		70		1.8		
10°R		30		0.8		
20°R		10		0.3		
10°L		40		0.8		
5 L		80		2.0		
Hor.-V		80		2.0		
5°R		80		2.0		
10°R		40		0.8		
20°L		10		0.3		
10°L		30		0.8		
5°D-V		70		1.8		
10°R		30		0.8		
20°R		10		0.3		
10°D-5°L		16		0.4		
5°R		16		0.4		
		Specified Maximum		Specified Maximum		
		300		18		

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Horizontal  
and above

Maximum:  
Location:

Bulbs operated at rated mean spherical candlepower.

Volts:

Amperes:

See Standard Notes 1 and 3

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### COLOR TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number \_\_\_\_\_

Color of device is (red) (yellow) ( ) Y ( ) N

Remarks \_\_\_\_\_

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### VIBRATION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number \_\_\_\_\_

Devices completed Vibration Test without evidence

of material weakness or failure of parts  
which affects proper function ( ) Y ( ) N

There was no evidence of Lens or reflector  
rotation which affects proper function. ( ) Y ( ) N

Necessary to rephotometer ( ) Y ( ) N

Additional photometric data sheet added to report ( ) Y ( ) N

Remarks \_\_\_\_\_

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### CORROSION TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number \_\_\_\_\_

The device completed the test without evidence of

Corrosion which impairs proper functioning of the  
Devices ( ) Y ( ) N

Remarks \_\_\_\_\_

---

### DUST TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

At completion of the test, the maximum indicated  
candlepower of the devices were within 10% of those  
prior to Dust Test ( ) Y ( ) N

Necessary to rephotometer ( ) Y ( ) N

Additional photometric data sheet added to report ( ) Y ( ) N

Remarks \_\_\_\_\_  
\_\_\_\_\_

### MOISTURE TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Number

Devices accumulated less than 2cc of Moisture ( ) Y ( ) N

Sealed units contained no visible moisture ( ) NA ( ) Y ( ) N

Remarks \_\_\_\_\_  
\_\_\_\_\_

# 11. TURN SIGNAL OPERATING UNIT TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ No. of Devices Tested \_\_\_\_\_  
Rated Voltage \_\_\_\_\_

## SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Physical Inspection		
Durability Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official Date

\_\_\_\_\_  
Title

## TEST DATA SHEETS

### Physical Inspection

Test performed by \_\_\_\_\_ Date \_\_\_\_\_  
Material from which the unit is made \_\_\_\_\_  
Identifying marks or letters \_\_\_\_\_  
Remarks \_\_\_\_\_

### DURABILITY TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_  
Maximum Bulb Load \_\_\_\_\_  
Test Cycle Rate \_\_\_\_\_  
Operating Voltage \_\_\_\_\_ Current \_\_\_\_\_  
Total number of Cycles \_\_\_\_\_  
Unit operative at completion of test Number  
( ) Y ( ) N  
The voltage drop across the operating unit terminals does not exceed 0.25 Volts — before, during, or after the test ( ) Y ( ) N

Remarks \_\_\_\_\_  
\_\_\_\_\_

DURABILITY TEST RESULTS

PRIOR TO TEST

DEVICE NUMBER

Voltage Drop  
ACROSS  
Terminal #

1- 2 3

(As necessary)

---

During Test  
Cycles

---

At Completion  
of Test

---

\*Denotes a Failure

## 12. TURN SIGNAL FLASHER TEST PROCEDURE

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ No. of Units Tested \_\_\_\_\_  
Contact Points N.O. \_\_\_\_\_ N.C. \_\_\_\_\_

### SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Starting Time Test		
Voltage Drop Test		
Flash Rate		
Per Cent Current "On" Time		
Durability Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title



TEST DATA SHEET

PHYSICAL INSPECTION

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Identifying marks or letters \_\_\_\_\_

STARTING TIME TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Flashers meet the specified starting  
time

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

VOLTAGE DROP TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The flashers do not exceed the voltage drop  
specified

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

FLASH RATE AND PER CENT CURRENT "ON" TIME

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The flashers meet Flash Rate and Current  
"ON" Time requirements

( ) - Y - ( ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

DURABILITY TEST

Test performed by \_\_\_\_\_ Test Started \_\_\_\_\_

Test Completed \_\_\_\_\_

The units met performance requirements  
at completion of Durability Test

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

# PERFORMANCE CHARACTERISTICS TEST -

Design Lamp Load: \_\_\_\_\_ No. \_\_\_\_\_ signalling bulbs  
plus  
\_\_\_\_\_ No. \_\_\_\_\_ indicator bulb

Model: \_\_\_\_\_  
Contact Points: \_\_\_\_\_ M.C. \_\_\_\_\_ N.C.

Test No.	STARTING TIME, seconds				VOLTAGE DROP, millivolts				FLASHING RATE AND BULB "ON" TIME			
	Start Number			Average	Cycle Number			Average	Time, seconds		Flashing Rate, (PPM)	Current "ON", (%)
	1	2	3		6	7	8		Total	On		
FL. No.												
-1												
-2												
-3												
-4												
-5												
-6												
-7												
-8												
-9												
-10												
-11												
-12												
-13												
-14												
-15												
-16												
-17												
-18												
-19												
-20												

\*Specified Limits:

seconds

mV

See SAE Polygon  
60-120 PPM 90-75%

\*Failures this Page:

Date of Test: \_\_\_\_\_

Ambient Temperature: 75°F ± 10°F

Performed by: \_\_\_\_\_

DC Potential of Lamp: 12.8 V

# PERFORMANCE CHARACTERISTICS TEST - (Design Lamp Load)

Model: \_\_\_\_\_  
Contact Points: N.C. N.O.

Ambient Temperature, F:		0°±5						
DC Lamp Potential:		12.0 V			15.0 V			
Test No. _____ Flasher No.	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)
	Total	On			Total	On		
-								
-1								
-2								
-3								
-4								
-5								
-6								
-7								
-8								
-9								
-10								
-11								
-12								
-13								
-14								
-15								
-16								
-17								
-18								
-19								
-20								

Ambient Temperature, F:				125°±5				
DC Lamp Potential:				11.0 V		14.0 V		
Test No. _____	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)
Flasher No.	Total	On			Total	On		
-1								
-2								
-3								
-4								
-5								
-6								
-7								
-8								
-9								
-10								
-11								
-12								
-13								
-14								
-15								
-16								
-17								
-18								
-19								
-20								

\*Specified Limits: See SAE Polygon 40-120 FPM 30-75%  
 \*Failures this Page: See SAE Polygon 40-120 FPM 30-75%  
 \*Failures allowed this 1/2 of Test: 3 Date of Test: \_\_\_\_\_  
 \*Total Failures this 1/2 of Test: Performed by: \_\_\_\_\_

PRE-LIFE PERFORMANCE CHARACTERISTICS TEST -  
(Design Lamp Load)

Model: \_\_\_\_\_  
Contact Point: U.C. H.O.

[illegible]

**second**

www

See SAE Polygon  
60-120 FPM 30-755

\*Failure this Page: 0

Date of Test: \_\_\_\_\_  
Performed by: \_\_\_\_\_

Ambient Temperature:  $75^{\circ}\text{F} \pm 10^{\circ}\text{F}$

\*Failure allowed this 1/4 of test: 0

DC Potential of Lamp: 12.2 V

# POST-LIFE PERFORMANCE CHARACTERISTICS TEST - (Design Lamp Load)

Model: \_\_\_\_\_  
Contact Points: \_\_\_\_\_ A.C. \_\_\_\_\_ A.D.

Test No.	STARTING TIME, seconds				VOLTAGE DROP, millivolts				FLASHING RATE AND BULB "ON" TIME			
	Start Number			Average	Cycle Number			Average	Time, seconds		Flashing Rate, (PPM)	Current "ON", (mA)
	1	2	3		5	7	8		Total	On		
-21												
-22												
-23												
-24												
-25												
-26												
-27												
-28												
-29												
-30												
-31												
-32												
-33												
-34												
-35												
-36												
-37												
-38												
-39												
-40												

\*Specified Limits:

seconds

mv

See SAE Polygon  
60-120 PPM 30-75%

\*Failures this Page:

Date of Test:

Ambient Temperature: 75°F ± 10°F

\*Failures Allowed this 1/8 of Test: 3

Performed by:

DC Potential of Lamps: 12.8 V

13. VEHICLE HAZARD WARNING SIGNAL

OPERATING UNIT TEST REPORT

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ No. of Units Tested \_\_\_\_\_  
Rated Voltage \_\_\_\_\_

SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Durability Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

TEST DATA SHEET

PHYSICAL INSPECTION

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Material from which the unit is made \_\_\_\_\_

Identifying marks or letters \_\_\_\_\_

Remarks \_\_\_\_\_

DURABILITY TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Maximum bulb load \_\_\_\_\_

Test cycle rate \_\_\_\_\_

Operating voltage \_\_\_\_\_ Current \_\_\_\_\_

Total number of cycles \_\_\_\_\_

Temperature \_\_\_\_\_

Unit operative at completion of test ( ) Y ( ) N

The voltage drop does not exceed 0.3 volts —  
before, during, or after the test ( ) Y ( ) N

VOLTAGE DROP

DEVICE NUMBER

1 2 3 (As necessary)

Prior to Test

End of Test

\*Denotes a failure



14. VEHICLE HAZARD WARNING SIGNAL FLASHER TEST PROCEDURE

Test Component \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Test Laboratory \_\_\_\_\_ Test Date \_\_\_\_\_  
Report Number \_\_\_\_\_ No. of Units Tested \_\_\_\_\_  
Contact Points N.O. \_\_\_\_\_ N.C. \_\_\_\_\_

SUMMARY

<u>Test</u>	<u>Results</u>	
	<u>Number Passed</u>	<u>Number Failed</u>
Physical Inspection		
Pilot Indication		
Starting Time Test		
Voltage Drop Test		
Flash Rate		
Per Cent Current "On" Time		
Durability Test		

\_\_\_\_\_  
Signature of Responsible Laboratory Official Date

\_\_\_\_\_  
Title

TEST DATA SHEET

Physical Inspection

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

Type of material from which unit is made \_\_\_\_\_

Identifying marks or letters \_\_\_\_\_

STARTING TIME TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The flashers meet the starting times  
specified

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

VOLTAGE DROP TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The flashers do not exceed the  
voltage drop specified

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

FLASH RATE AND PERCENT CURRENT "ON" TIME

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The flashers meet Flash Rate and  
current "On" time

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

DURABILITY TEST

Test performed by \_\_\_\_\_ Date \_\_\_\_\_

The units were able to meet performance  
requirements at completion of the Dura-  
bility Test

Number  
( ) Y ( ) N

Remarks \_\_\_\_\_

\_\_\_\_\_

# PERFORMANCE CHARACTERISTICS TEST -

Maximum Lamp Load:        No.        signalling bulbs  
       plus  
       No.        indicator bulbs

Model:                       
Contact Points:        S.C.        N.D.

Test No.	STARTING TIME, seconds				VOLTAGE DROP, millivolts				FLASHING RATE AND BULB "ON" TIME			
	Start Number			Average	Cycle Number			Average	Time, seconds		Flashing Rate, (PPM)	Current "On", (%)
	1	2	3		6	7	8		Total	On		
FL. No.												
-1												
-2												
-3												
-4												
-5												
-6												
-7												
-8												
-9												
-10												
-11												
-12												
-13												
-14												
-15												
-16												
-17												
-18												
-19												
-20												

\*Specified Limits: 1.5 seconds

500 mV

See SAE Polygon  
60-120 PPM 30-75%

\*Failures this Page:

Date of Test:                     

Ambient Temperature: 75°F ± 10°F

Performed by:                     

DC Potential of Lamps: 12.0 V

# PERFORMANCE CHARACTERISTICS TEST -

Two No. \_\_\_\_\_ signalling bulbs  
 Minimum Lamp Load: \_\_\_\_\_ plus \_\_\_\_\_ Model: \_\_\_\_\_  
 One No. \_\_\_\_\_ indicator bulb Contact Points: \_\_\_\_\_ A.C. \_\_\_\_\_ A.D.

Test No. _____ FL. No.	STARTING TIME, seconds				FLASHING RATE AND BULB "ON" TIME			
	Start Number			Average	Time, seconds		Flashing Rate, (SPH)	Current "ON", (S)
	1	2	3		Total	On		
-1								
-2								
-3								
-4								
-5								
-6								
-7								
-8								
-9								
-10								
-11								
-12								
-13								
-14								
-15								
-16								
-17								
-18								
-19								
-20								

\*Specified Limit: 1.5 seconds

See SAE Polygon  
 60-120 FPM 30-784

\*Failures this Page:

Date of Test: \_\_\_\_\_

Ambient Temperature: 75°F ± 10°F

Performed by: \_\_\_\_\_

DC Potential of Lamps: 12.8 V

# PERFORMANCE CHARACTERISTICS TEST - (Maximum Lamp Load)

Model: \_\_\_\_\_  
Contact Points: - A.C. N.O.

Ambient Temperature, F:		125±5							
DC Lamp Potential:		11.0 V				13.0 V			
Test No. _____ Flasher No.	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)	
	Total	On			Total	On			
-1									
-2									
-3									
-4									
-5									
-6									
-7									
-8									
-9									
-10									
-11									
-12									
-13									
-14									
-15									
-16									
-17									
-18									
-19									
-20									

Ambient Temperature, F:		125±5							
DC Lamp Potential:		11.0 V				13.0 V			
Test No. _____ Flasher No.	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)	
	Total	On			Total	On			
-1									
-2									
-3									
-4									
-5									
-6									
-7									
-8									
-9									
-10									
-11									
-12									
-13									
-14									
-15									
-16									
-17									
-18									
-19									
-20									

\*Specified Limits:

See SAE Polygon  
60-120 FPM 30-75%

See SAE Polygon  
60-120 FPM 30-75%

\*Failed this Page:

Date of Test: \_\_\_\_\_  
Performed by: \_\_\_\_\_

# PERFORMANCE CHARACTERISTICS TEST - (Minimum Lamp Load)

Model: \_\_\_\_\_  
Contact Points: \_\_\_\_\_ N.C. \_\_\_\_\_ N.O.

Ambient Temperature, F: _____		DC Lamp Potential: _____		0005				
GC Lamp Potential: _____		11.0 V		13.0 V				
Test No. _____ Flasher No. _____	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)
	Total	On			Total	On		
-1								
-2								
-3								
-4								
-5								
-6								
-7								
-8								
-9								
-10								
-11								
-12								
-13								
-14								
-15								
-16								
-17								
-18								
-19								
-20								

Ambient Temperature, F:		125±5						
DC Lamp Potential:		11.0 V			13.0 V			
Test No. _____ Flasher No.	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)
	Total	On			Total	On		
-1								
-2								
-3								
-4								
-5								
-6								
-7								
-8								
-9								
-10								
-11								
-12								
-13								
-14								
-15								
-16								
-17								
-18								
-19								
-20								

See SAE Polygon 60-120 FPM 30-75%  
 \*Specified Limits:  
 \*Failures this Page:  
 \*Failures allowed this 1/2 of Test: 3  
 \*Total Failures this 1/2 of Test:  
 Date of Test: \_\_\_\_\_  
 Performed by: \_\_\_\_\_

**PRE-LIFE PERFORMANCE CHARACTERISTICS TEST -**  
(Maximum Lamp Load)

Model: \_\_\_\_\_  
Contact Points: N.C. N.O.

Test No.	STARTING TIME, seconds				VOLTAGE DROP, millivolts				FLASHING RATE AND BULB "ON" TIME			
	Start Number			Average	Cycle Number			Average	Time, seconds		Flashing Rate, (FPM)	Current "ON", (C)
	1	2	3		6	7	8		Total	On		
-21												
-22												
-23												
-24												
-25												
-26												
-27												
-28												
-29												
-30												
-31												
-32												
-33												
-34												
-35												
-36												
-37												
-38												
-39												
-40												

\*Specified Limit: 1.5 seconds

450 wv

See SAE Polygon  
50-120 FPM 50-75C

\*Failed this Page: 0

Date of Test: \_\_\_\_\_ Ambient Temperature: 75°F ± 10°F

Performed by: \_\_\_\_\_ DC Potential of Lamps: 12.8 V



**PRE-LIFE PERFORMANCE CHARACTERISTICS TESTS -**  
(Minimum Lamp Load)

Model: \_\_\_\_\_  
Contact Points: N.C. N.O.

Test No.	STARTING TIME, seconds				FLASHING RATE AND BULB "ON" TIME			
	Start Number			Average	Time, seconds		Flashing Rate, (PPH)	Current "ON", (%)
	1	2	3		Total	On		
-21								
-22								
-23								
-24								
-25								
-26								
-27								
-28								
-29								
-30								
-31								
-32								
-33								
-34								
-35								
-36								
-37								
-38								
-39								
-40								

Specified Limit: 1.5 seconds

See SAE Polygon  
40-120 PPH 50-75%

\*Failures this Page: 0

\*Failures Allowed this 1/4 of Test: 0

Date of Test: \_\_\_\_\_  
Performed by: \_\_\_\_\_

Ambient Temperature: 75°F ± 10°F

DC Potential of Lamp: 12.8 V

# POST-LIFE PERFORMANCE CHARACTERISTICS TEST - (Maximum Lamp Load)

Model: \_\_\_\_\_  
Contact Points: \_\_\_\_\_ N.C. \_\_\_\_\_ N.O.

Test No.	STARTING TIME, seconds				VOLTAGE DROP, millivolts				FLASHING RATE AND BULB "ON" TIME			
	Start Number			Average	Cycle Number			Average	Time, seconds		Flashing Rate, (FPM)	Current "ON", (%)
	1	2	3		6	7	8		Total	On		
Fl. No.												
-21												
-22												
-23												
-24												
-25												
-26												
-27												
-28												
-29												
-30												
-31												
-32												
-33												
-34												
-35												
-36												
-37												
-38												
-39												
-40												

\*Specified Limits: 1.5 seconds

850 mv

See SAE Polygon  
60-120 FPM 50-75%

\*Features this Page:

Date of Test: \_\_\_\_\_

Ambient Temperature: 75°F ± 10°F

Performed by: \_\_\_\_\_

BC Potential of Lamps: 12.8 V

**POST-LIFE PERFORMANCE CHARACTERISTICS TESTS -**  
(Minimum Lamp Load)

Model: \_\_\_\_\_  
Contact Points: \_\_\_\_\_ H.C. \_\_\_\_\_ H.O. \_\_\_\_\_

Test No.  FL. No.	STARTING TIME, seconds				FLASHING RATE AND BULB "ON" TIME			
	Start Number			Average	Time, seconds		Flashing Rate, (FPM)	Current "ON", (A)
	1	2	3		Total	On		
-21								
-22								
-23								
-24								
-25								
-26								
-27								
-28								
-29								
-30								
-31								
-32								
-33								
-34								
-35								
-36								
-37								
-38								
-39								
-40								

\*Specified Limit: 1.5 seconds

See SAE Polygen  
60-120 FPM 30-75%

\*Failures this Page:

Date of Test: \_\_\_\_\_  
Performed by: \_\_\_\_\_

Ambient Temperature: 75°F ± 10°F

\*Failures allowed this 1/4 of Test:

DC Potential of Lamps: 12.8 V

\*Total Failures this 1/4 of Test:



LEFT INTENTIONALLY BLANK



## GENERAL TEST PROCEDURE

### SAMPLES FOR TESTS

Samples supplied by the NHTSA for laboratory test will be representative of the devices as regularly manufactured and marketed. Where necessary, a mounting bracket will be provided so that the device may be rigidly bolted in its operating position on the various test equipment. The sample will include all accessory equipment necessary to operate it in a normal manner.

### PHYSICAL INSPECTION

Physical inspection will be performed on all devices prior to mechanical or photometric testing. This inspection will include general information concerning the device such as lens material, markings, illuminated projected areas, socket dimensions, etc.

The items applicable to each device are shown in that item's specific test procedure.

Bulbs Sockets shall be inspected as follows:

Note: 1. Wedge base type sockets need not be subjected to the test outlined in this section.

2. Other types of sockets may be used as long as the socket does not inhibit the intended function of the lamp.

(a) Insert the applicable plug gage shown below into the lamp socket and verify the go no-go characteristics of the socket and plug gage.

<u>Socket (Type)</u>	<u>Go Gauge Dia. (Inches)</u>	<u>No-Go Gauge Dia. (Inches)</u>
A-1	0.3665	0.3735
B-1	0.6035	0.6095
B-2	0.6035	0.6095
C-2	0.6035	0.6095

(b) With a depth gage, measure the total compression distance from the top of the socket to the fully compressed contact, Dimension "B."

APPENDIX A  
GENERAL TEST PROCEDURE

SAMPLES FOR TEST  
PHYSICAL INSPECTION

BULBS AND BULBS SOCKETS



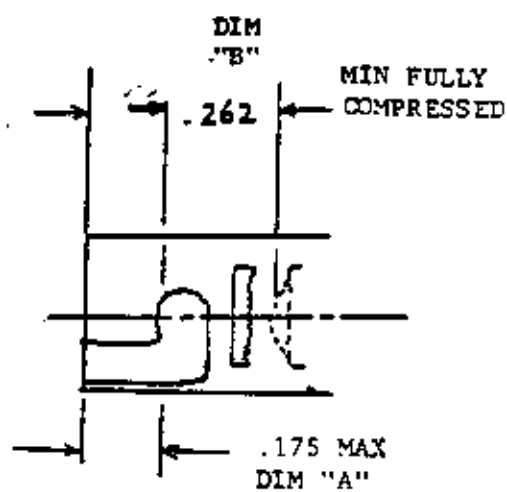
(c) Measure the distance, Dimension "A" from the top of the socket to the J-slot as shown on page using a vernier caliper.

(d) Insert the applicable minimum gage shown below into the socket of the lamp, and verify the gage is retained by the J-slot.

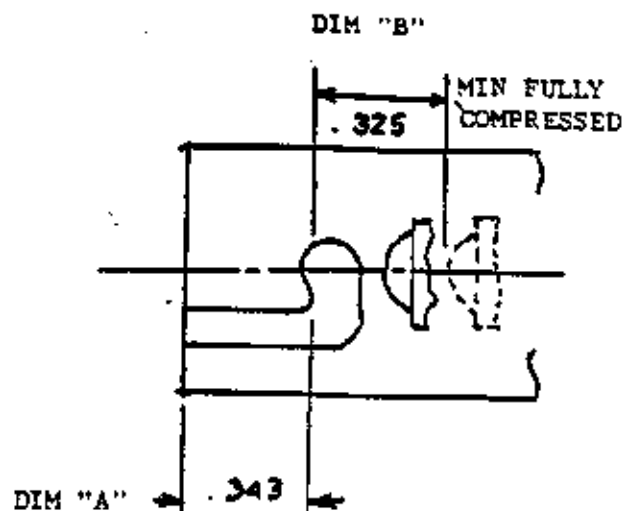
#### EQUIPMENT

The minimum test equipment outlined below shall be utilized for measuring test parameter:

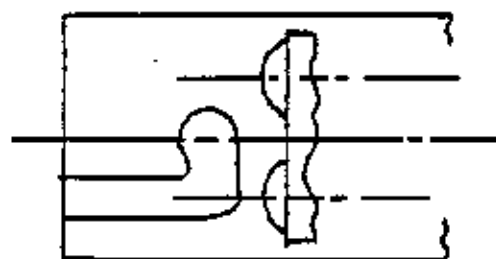
<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Minimum Gage	See Detail Procedure	$\pm 0.003$ Tool to measure diam. "B" ( $\pm 0.001$ )
Vernier Caliper	0-3 in.	0.001



SOCKET FOR BULB BASE A-1

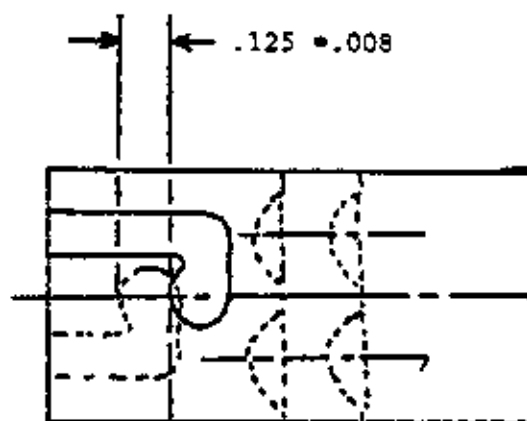


SOCKET FOR BULB BASE B-1



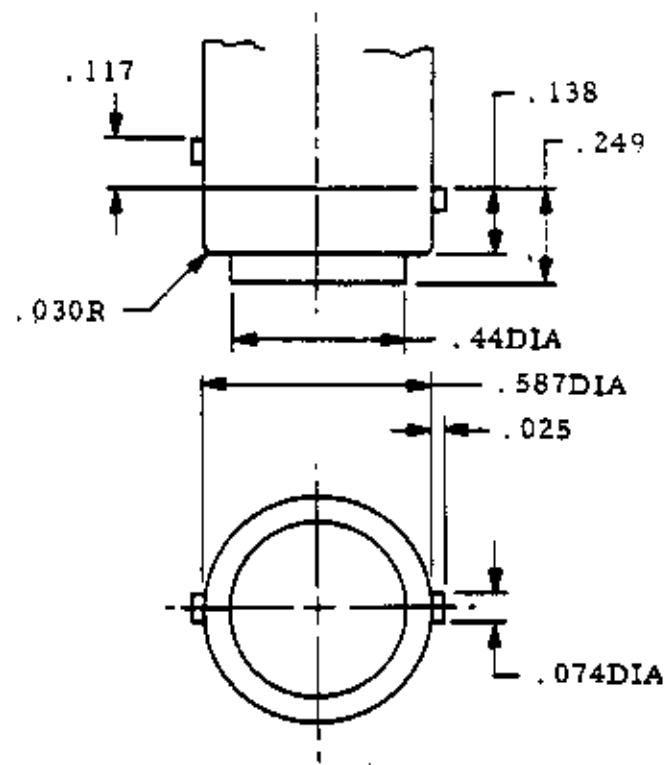
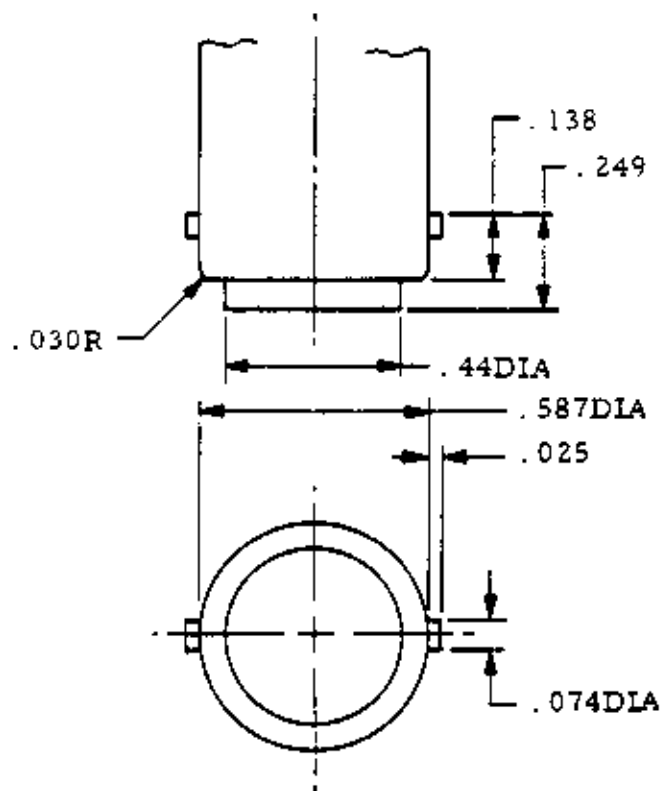
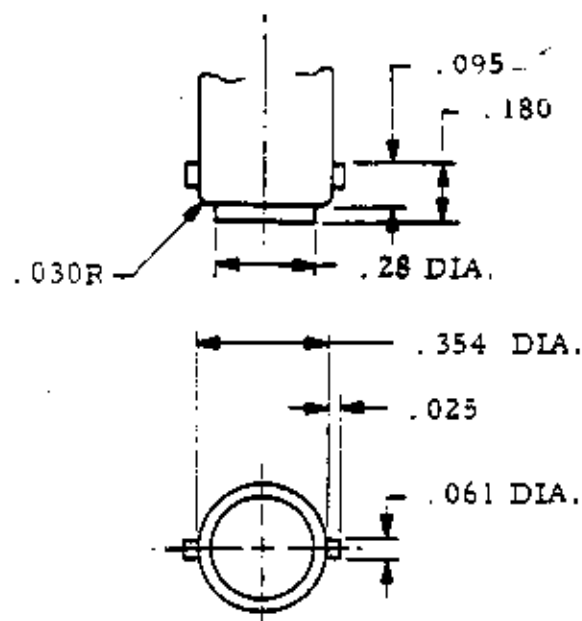
DIMENSION SAME  
AS BULB BASE B-1

SOCKET FOR BULB BASE B-2



DIMENSION SAME  
AS BULB BASE B-1

SOCKET FOR BULB BASE C-2



# MINIMUM BULB GAUGES

## CALIBRATION PROCEDURE FOR STANDARD LAMPS

### DEFINITIONS

#### Secondary Intensity Standard

A lamp calibrated by the National Bureau of Standards which specifies voltage, current, horizontal cp and (if necessary) color temperature for each specimen. These standards shall be maintained in groups of a least three units.

#### Secondary Standard of Luminous Flux

A lamp calibrated by the National Bureau of Standards which specifies voltage, current, and Lumens or mean spherical cp for each specimen. These standards shall be maintained in groups of at least three units.

#### Working Intensity and Luminous Flux Standards

These lamps, calibrated against secondary standards, are used to calibrate photometers and integrating spheres. If the test laboratory does not maintain secondary standards, it may purchase working standards from an accredited supplier.

#### Rated Bulbs

Lamps which are calibrated by the test laboratory in an integrating sphere against the working standards of Luminous Flux. Rated bulbs are calibrated to yield the rated mean spherical cp for which they are designed. Voltage and current are specified by the test laboratory for each specimen.

Select bulbs with filament location (light center length and axial alignment) within .010 inch and  $7\frac{1}{2}$  degrees of nominal design position. Determine and record the voltage and current associated with rated mean spherical cp. Operate the bulbs under these conditions during tests. Bulbs without an rated mean spherical cp assigned by the manufacturer will be selected to satisfy the required filament location. These bulbs, and those sealed within lamps shall be operated at design voltage for the particular bulbs. Recalibrate rated bulbs after 3 working hours. In case of failure, recalibrate the bulb within 24 hours.

## CALIBRATION

### Secondary Intensity and Luminous Flux Standards

Secondary standards shall be recalibrated at the NBS after no more than 10 workings hours. The standards shall be used so that the test laboratory can detect deviations in their performance characteristics. The ratio between the specified voltage (measured at the lamp base) and the current shall not be allowed to deviate by more than 1/10 of 1 percent from the calibrated ratio of the values as received from the NBS. If this ratio exceeds 1/10 of 1 percent, the lamps shall be recalibrated.

### Records

The test laboratory shall maintain appropriate logs showing at least the following information:

1. Standard bulb identification.
2. Elapsed time of usage.
3. Calibration dates.
4. Pertinent calibration vaues.



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APPENDIX B

GENERAL TEST

PROCEDURE

VIBRATION

## VIBRATION TEST

### Procedure

Prior to installing the test specimen on the vibration test machine, verify with a gage block that amplitude of the vibration mechanism is  $1/5 \pm 1/64$  inch and that the spring tension is 60 to 70 pounds.

Install the test specimen, with the manufacturer's supplied mounting bracket, and appropriate hardware on the mechanical vibrator as shown. Mount the longitudinal axis of the device parallel to the longitudinal axis of the vibrator. Vibrate the test specimen at a rate of  $750 \pm 25$  cpm for a period of 60 minutes.

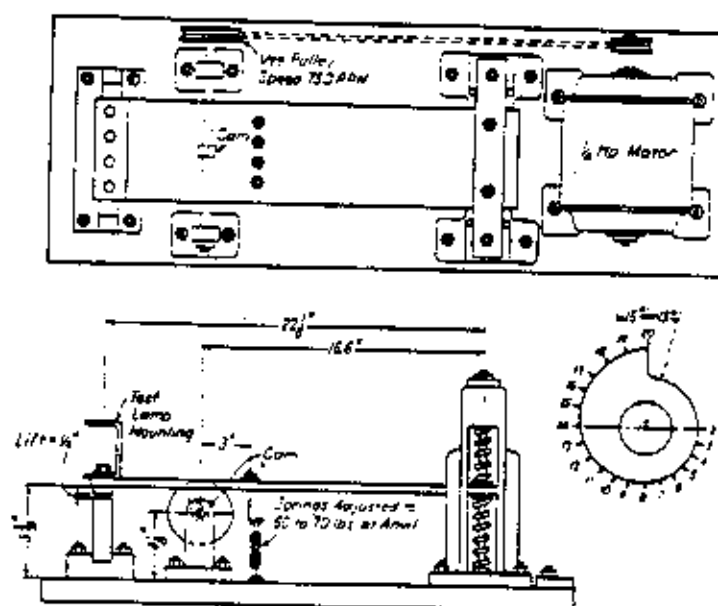
Remove the test specimen from the vibration machine, and visually and manually inspect the test specimen for evidence of damage, deformation or lens and/or reflector rotation. In case of lens and/or reflector rotation, the specimen shall be photometered to determine if requirements are still met.

Record the results of the visual inspection on the applicable data sheet.

### EQUIPMENT

The minimum test equipment outlined below shall be utilized for measuring the test parameters:

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Tachometer or Similar Device	0-1000 cpm	$\pm 1$ percent
Gage Block	$0.125 \pm .005$	N/A
Spring Scale	0-100 pounds	$\pm 2$ pounds
Timer	0-2 hours	$\pm 1$ minute



### CAM PROFILE RADII<sup>a</sup>

Point	Radius, in.	Point	Radius, in.	Point	Radius, in.	Point	Radius, in.
1	0.5000	6	0.5504	11	0.6284	16	0.7064
2	0.5000	7	0.5660	12	0.6440	17	0.7220
3	0.5086	8	0.5816	13	0.6596	18	0.7376
4	0.5192	9	0.5972	14	0.6752	19	0.7466
5	0.5348	10	0.6128	15	0.6908	20	0.7500

<sup>a</sup>The cam width is to be between 1/2 and 1 in.

### VIBRATION TEST SET UP



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APPENDIX C

GENERAL TEST

PROCEDURE

MOISTURE TEST

## MOISTURE TEST

### Procedure

Install the test specimen in its supplied support frame with socket and any covering normally part of the assembly, in the moisture test chamber as shown below.

Verify that all drain holes are open, the precipitation rate is 0.1 inch of water per minute and that the specimen rotates about a vertical axis at a rate of 4 rpm. Determine that water flow is at required delivery rate and record every 3 hours during test. Subject the specimen to these conditions for a period of 12 hours. Upon completion of the 12-hour test period, discontinue the Moisture Test and, without moving the specimen, allow the specimen to drain for 1 hour.

After the 1-hour drain period, remove the specimen from the chamber and collect the accumulated water in a graduated vessel. Accumulation in excess of 2 cc. constitutes a failure.

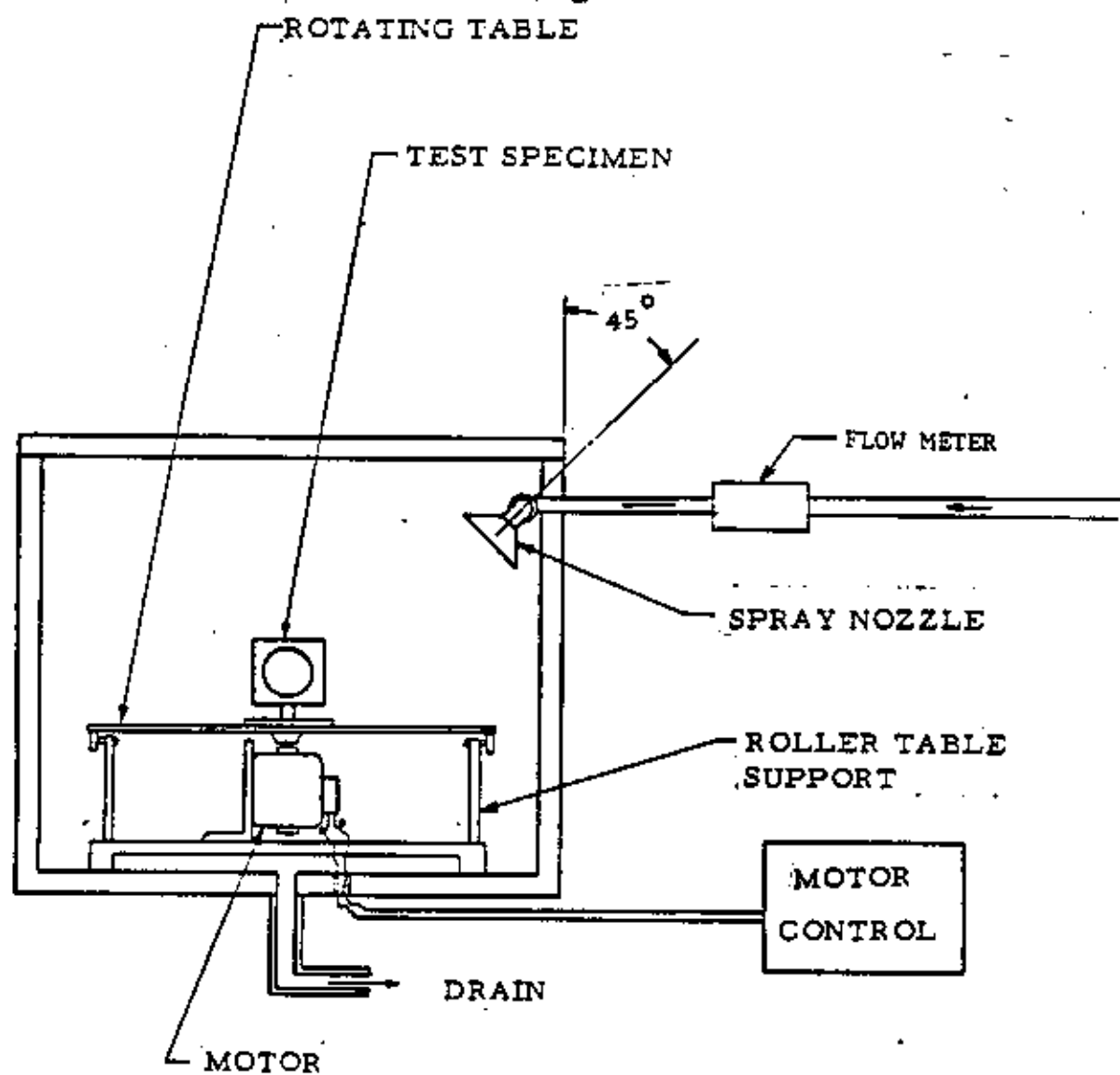
Record the results of the Moisture Test on the appropriate data sheet.

### TEST EQUIPMENT

The minimum equipment described below shall be utilized for measuring the test parameters.

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Moisture Test Chamber	N/A	N/A
Rain Gage	0-12 inches	$\pm$ 0.1 inch
Graduated Cylinder	0-10 cc	$\pm$ 0.5 cc
Timer	0-24 hours	$\pm$ minute
Stop Watch	0-60 seconds	$\pm$ 0.1 second
Flow Meter or equivalent	Depend on Nozzle	$\pm$ 5 percent





MOISTURE TEST SETUP



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APPENDIX D

GENERAL TEST PROCEDURE

DUST TEST



## DUST TEST

### Procedure

Install the test specimen with socket and any covering normally part of the assembly mounted on its supplied support frame, 6 inches from the walls, in the test chamber shown below, with all drain holes closed.

Ensure that the test chamber contains 10 pounds of fine powdered cement conforming to ASTM 150-56, Type I.

Subject the specimen to a 2-second air blast at 15-minute intervals for a period of 5 hours.

Remove the test specimen from the chamber at the completion of the test and clean the exterior surfaces with dry soft cloth.

Inspect the test specimen for dust on interior surfaces. If any is found, subject the test specimen to a photometric test to determine if maximum cp is within 10 percent of that recorded prior to the Dust Test. A loss of more than 10 percent in cp at the point of maximum cp shall be considered a failure. Record results of the Dust Test on the appropriate data sheet.

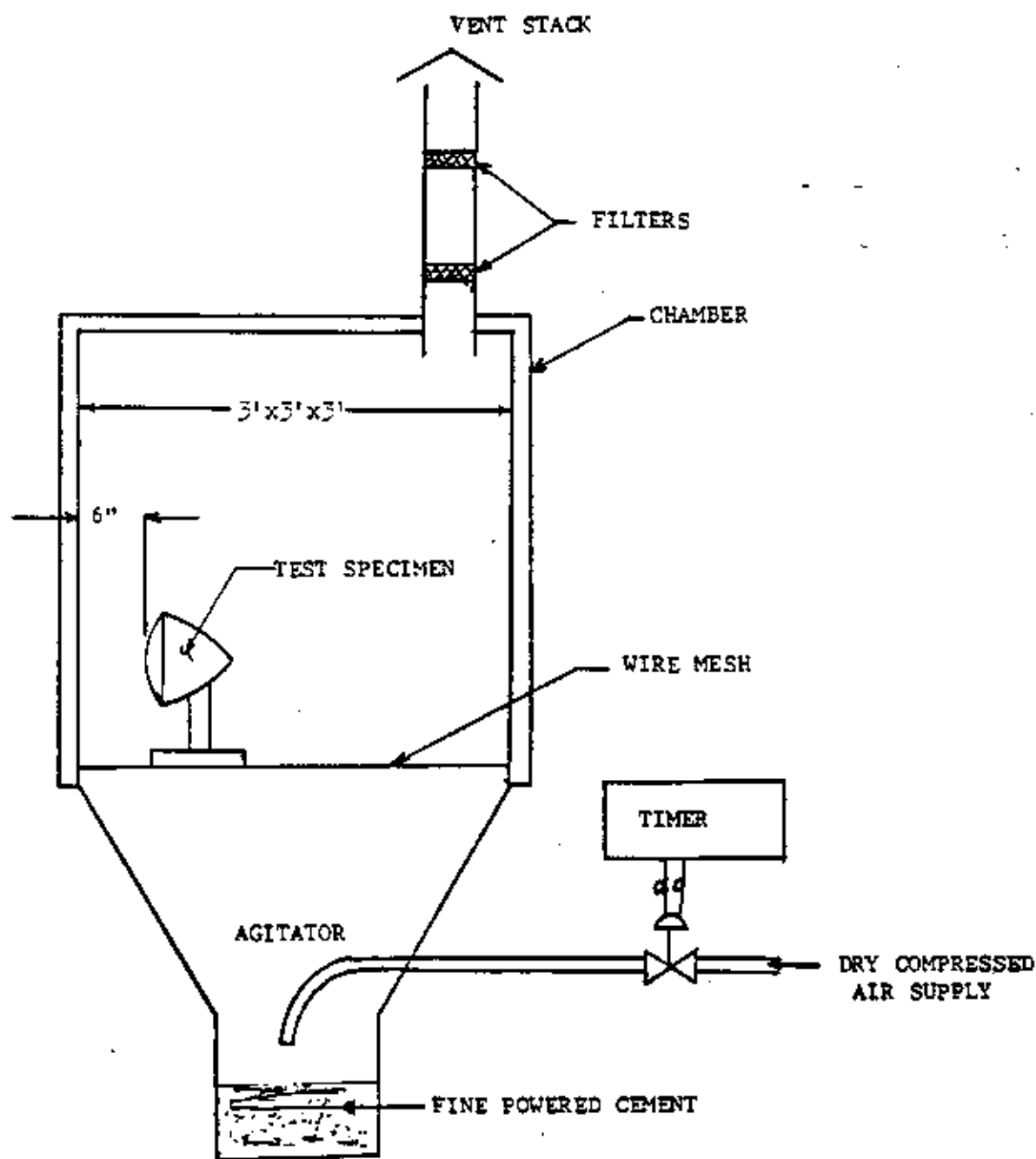
### TEST EQUIPMENT

The minimum equipment described below shall be utilized for measuring the test parameters:

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Dust Chamber	N/A	N/A
Timer	0-30 inches	$\pm$ 0.5 second
Stop Watch	0-60 seconds	$\pm$ 0.1 second







DUST TEST SETUP



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189A



APPENDIX E  
GENERAL TEST PROCEDURE  
CORROSION TEST

## CORROSION TEST

The analysis and calibration aspects of the salt spray shall be in accordance with ASTM Procedure B117 entitled: "Method of Salt Spray (Fog) Testing," dated June 1962.

### Procedure

Prepare a salt solution by dissolving  $5 \pm 1$  parts of salt by weight in 95 parts of distilled water or water containing not more than 200 PPM of total solids. Use dry salt which does not contain, on a dry basis, more than 0.1 percent of sodium iodide and not more than 0.3 percent of total impurities. After the solution has been atomized and stabilized at 95 + 2-3 F in the salt spray chamber, collect a suitable amount of solution, and ensure that the pH range is within 6.5 and 7.2.

Verify that the solution utilized in the salt spray chamber is free of solids in suspension and that the compressed air supply to the nozzle utilized for atomizing the salt solution is maintained between 10 and 25 psig.

Clean the external surfaces of the test specimen with a soft damp rag to remove fingerprints and any foreign matter which could influence the test results.

Position the specimen with socket and any cover normally supplied with the assembly in the test chamber, as shown below, at an angle of 15 to 30 degrees from the vertical and parallel to the principal direction of the horizontal flow of salt fog through the chamber based upon the largest plane surface of the test specimen. If multiple specimens are being tested, the specimens shall be positioned to preclude any possibility that surfaces are in contact, overlap or of solution dripping from one specimen onto another. Subject the test specimen to two cycles of 24 hours of salt exposure and 1 hour drying time after each exposure.

Remove the specimen from the test chamber immediately after the test has been completed and wash off the salt residue with tap water, not exceeding 100 F temperature.

There shall be no visible evidence of corrosion which could affect the proper functioning of the test specimen.

If there is any doubt concerning test outcome, the test specimen shall be subjected to a Photometric Test to determine if the Corrosion Test has impaired the proper functioning of the specimen.

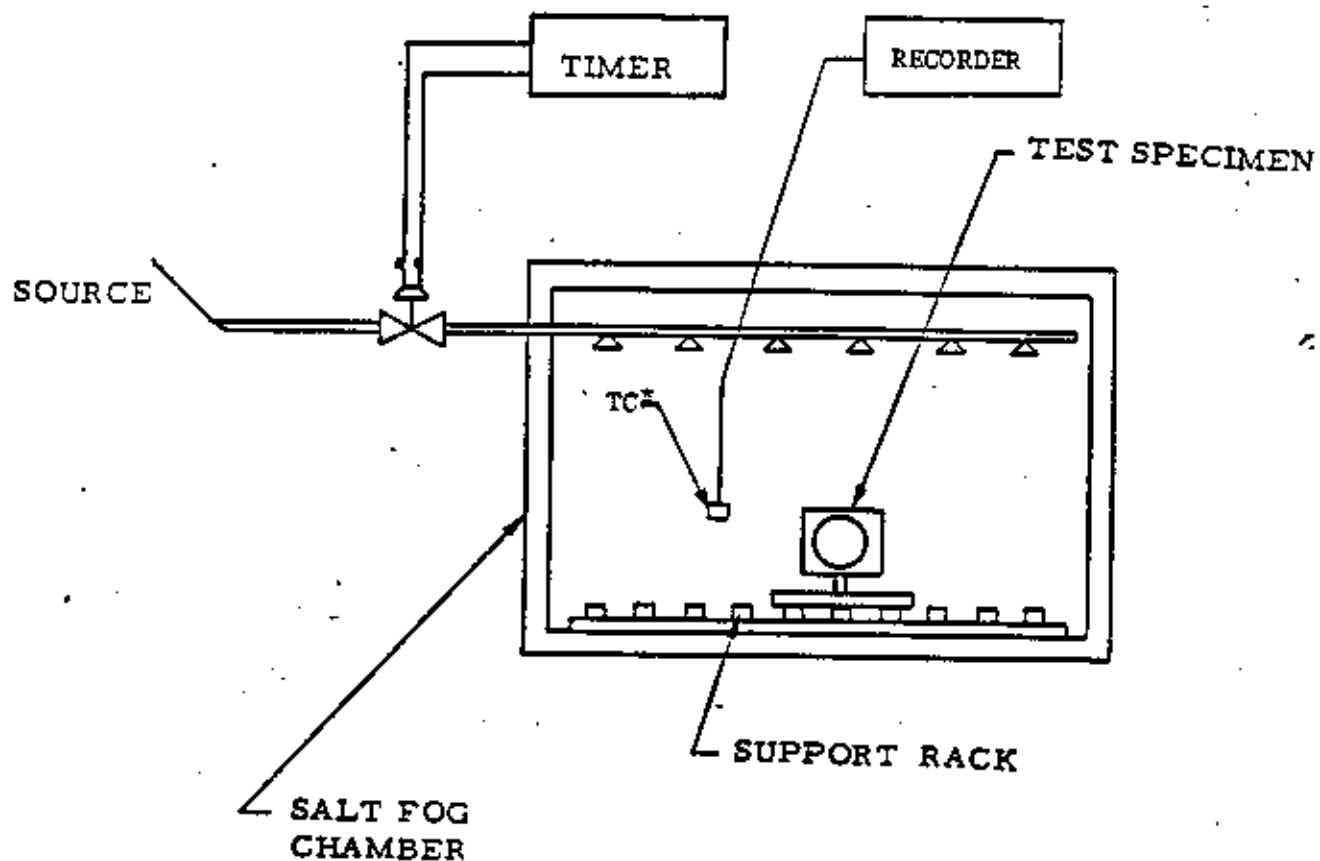
Record the results of the corrosion test on the-appropriate data sheet.

#### TEST EQUIPMENT

The minimum equipment described below shall be utilized for measuring the test parameter.

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Salt Spray Chamber	N/A	N/A
Temperature Recorder	0-100 F	$\pm 1$ F
Spring Scale	0-10 pounds	$\pm 0.1$ pounds
Thermometer	0-200 F	0.5 F
pH Meter	1-14 pH	$\pm 0.3$ percent
Pressure Gage	0-50 psig	$\pm 1.0$ percent

\*The Salt Spray Chamber shall be constructed and maintained in accordance with ASTM Procedure B117-62, latest revision.



CORROSION TEST SETUP

\*Locate Thermocouple within 6in. of test specimen & at least 6in. from any wall



APPENDIX F

GENERAL TEST PROCEDURE

COLOR TEST



## COLOR TEST

### Procedure

Use the visual method, to determine the color of the light from the applicable specimen. Operate the specimen at its design rated voltage. Install bulbs, caps, lenses in or on the specimen in a manner which simulates the intended application.

Evaluate all reference color measurements with the appropriate filter with a Standard Illuminant Source "A" operating at a filament color temperature of 2854 K.

Utilizing the test system shown below or similar comparison equipment mount the lighting device in the proper position. Adjust the voltage of the test specimen to the specified rating. Adjust the visual comparator's lamp voltage level to obtain a color temperature of 2854 K.

### Red Color Lens

Insert the red limit filter for evaluating apparent red color lenses into the visual comparator, and adjust the moveable diffusion glass to equalize the intensity of the reference standard and the specimen. Evaluate the color of the red light by determining that the color is not less saturated (paler), yellower or bluer than the limit filter standard. Record the results on the appropriate data sheet.

### Yellow Color Lens

Insert the  $Y = 0.390$  limit filter for evaluating apparent yellow colored lenses into the visual comparator, and adjust the moveable diffusing glass to equalize the intensity of the reference standard and the specimen. Evaluate the color of the yellow light by determining that the color is not less saturated, or redder, than the limit filter standard. Record the results on the data sheet. Insert the  $Y = 0.440$  limit filter standard into the visual comparator standard and readjust the moveable diffusing glass to equalize the intensity of the reference standard with the test specimen. Evaluate the color of the yellow light by determining that the color is not less saturated, or greener, than the limit filter standard. Record the results on the data sheet.

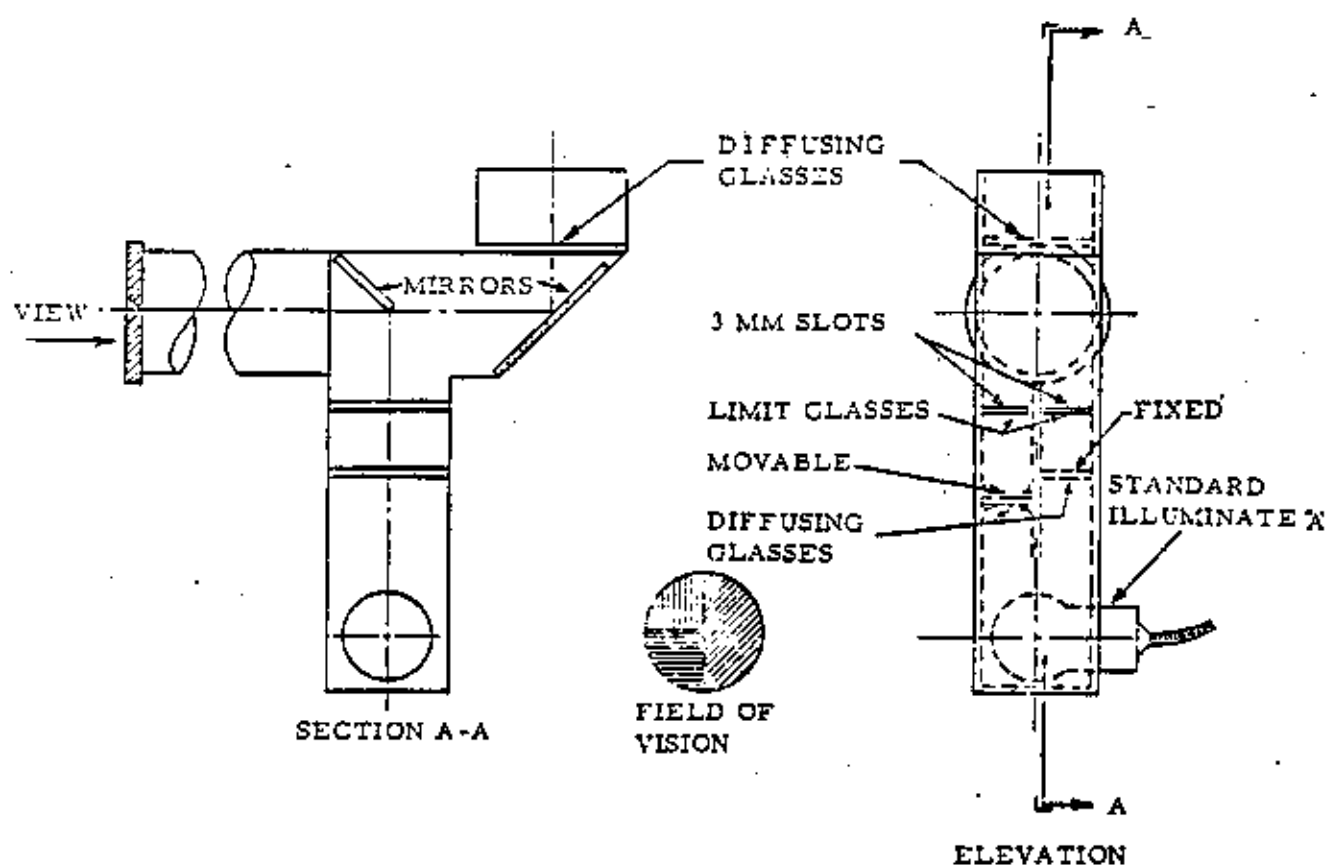
### White Color Lens

Install the same type of lamp bulb into the comparator as that type of bulb installed in the test specimen. No filters are required for this test. If sealed beam headlamps are the designated specimens, use the Standard Illuminant "A" as the reference also without the filter. Adjust the moveable diffusing glass to equalize the intensity of the reference standard with the test specimen. Evaluate the color of the white light by determining that the color is not different from the color of the light permitted from the reference light. Record the results on the appropriate data sheet.

### TEST EQUIPMENT

The minimum equipment described below shall be utilized for measuring the test parameters:

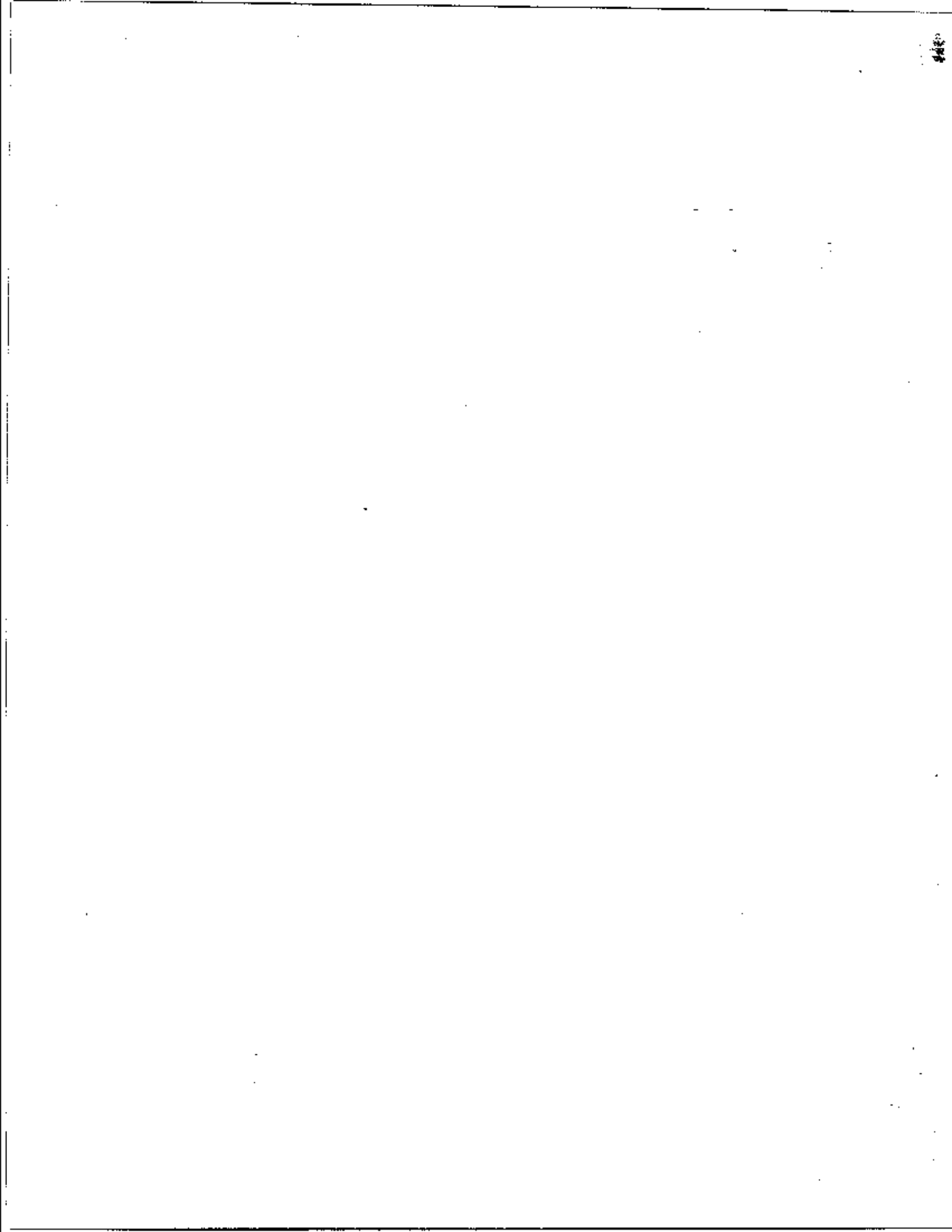
<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Red Limit Filter	Y - 0.330	1 percent
Yellow Limit Filter	Y - 0.390	1 percent
Yellow Limit Filter	Y - 0.440	1 percent
Standard Illuminant Source "A"	Color Temperature 2854 $\pm$ 50 K	1 percent
Visual Color Comparator	N/A	N/A
Voltmeter	0-20 volts DC	$\pm$ 0.5 percent
Power Supply	0-20 volts DC	$\pm$ 1.0 percent



VISUAL COLOR COMPARATOR



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APPENDIX G

GENERAL TEST PROCEDURE

PHOTOMETRIC TEST

## PHOTOMETRIC TEST

### Procedure

Install the device with its supplied mounting fixture, if applicable, in the appropriate test setup shown in this procedure. The device must be mounted in its normally installed operating position. Test distances shall be as stated in the specific test procedure for that device. The test room shall be completely dark and painted with nonreflective black paint. Prior to testing the lens shall be cleaned with a soft dry cloth only, or with a solution which will not affect the lens surface.

Photometric testing shall be performed as follows:

#### a. Headlamp Units

Align the center of the lamp with the center of the photometer by means of a transit or equivalent. Align the mounting plane parallel to the photometer.

1. Seven inch diameter Type 2 and all 5 3/4 inch diameter units - align and aim the headlamp as above.
2. Motorcycle and motor driven cycle headlamps - align and aim the upper beam of a multiple beam headlamp by adjusting the goniometer and locating the geometric center of the high intensity zone so that it lies 0.4 degrees vertically below lamp axis. Align and aim a single beam headlamp unit by adjusting the beam vertically to obtain 2,000 cp at the H-V point, and assure that the geometric center of the high intensity zone is below the H-V point on the photometric screen. Photometric readings shall be started at the H-V point and then shall be taken at other specified test points. After all readings are recorded, the value of the H-V point reading shall be verified by returning to that position.

#### b. All other lamps (except license lamps)

For single front and rear lamps, distance and angles shall be measured from the incandescent filament. For multicompart ment lamps or multiple lamps, distance and angles shall be measured from the geometric center of the assembly. The lamp axis shall be taken as a horizontal line through the light source parallel to the longitudinal axis of the vehicle with the lamp in its normal position.

For side lamps, the lamp axis shall be taken as a horizontal line through the light source perpendicular to the longitudinal axis of the vehicle with the lamp in its normal position.

Determine the center of the lamp. Align the center of the lamp with the center of the photometer by means of a transit or equivalent.

Set power supply to obtain the required mean spherical cp specified for that calibrated bulb.

After thermal equilibrium has been reached, photometric readings shall be started at the H-V point and then shall be taken, manually, at other specified points. For tail lamps, turn signal lamps and stop lamps, the points in Group 4 (5U-V, H-5L, H-V, H-5R and 5D-V), shall be taken after readings for points in Groups 1, 2, 3, 5, 6 and 7 have been taken. After all readings are recorded, the value of the H-V point reading shall be verified by returning to that position. For provisions relating to rated bulbs, refer to page 152 of this test procedure.

Photometric readings shall be started at the H-V point and then shall be taken at other specified points. After all readings are recorded, the value of the H-V point reading shall be verified by returning to that position.

c. License Plate Lamps

Align and aim the photometer as shown below. The illuminated area viewed by the sensing element shall not exceed that of a 1-inch diameter circle. Connect the power supply to the calibrated bulb which has been installed in the device. Set bulb voltage to obtain the required mean spherical cp specified for that calibrated bulb. Measure the radiated light from the white dummy license card at the locations specified. Measure the angle of incident light to the plate. The angle shall not be less than 8 degrees.

d. Reflex Reflectors

Align the center of the reflector with the center of the Standard Illuminant "A" by means of a transit, or equivalent. Adjust the reflector such that it is normal to collimated light from the Standard Illuminant "A." If the effective reflective area of the reflex is greater than 12 square inches, place a black, nonreflecting tape around the perimeter of the reflector to reduce the reflective area to 12 square inches.

Connect the power supply to the source of illumination and set power supply to obtain the operating color temperature of 2854 K. Position the sensing element in place of the reflex

reflector to calibrate the photometer. After the calibration position the sensing element as shown in the Reflex Reflector diagram. Move sensing element to the observation point specified, and measure the incident light at the various observation and entrance angles as shown in the specific test procedure for the device.

#### Equipment

The minimum equipment described below shall be utilized for measuring the test parameters.

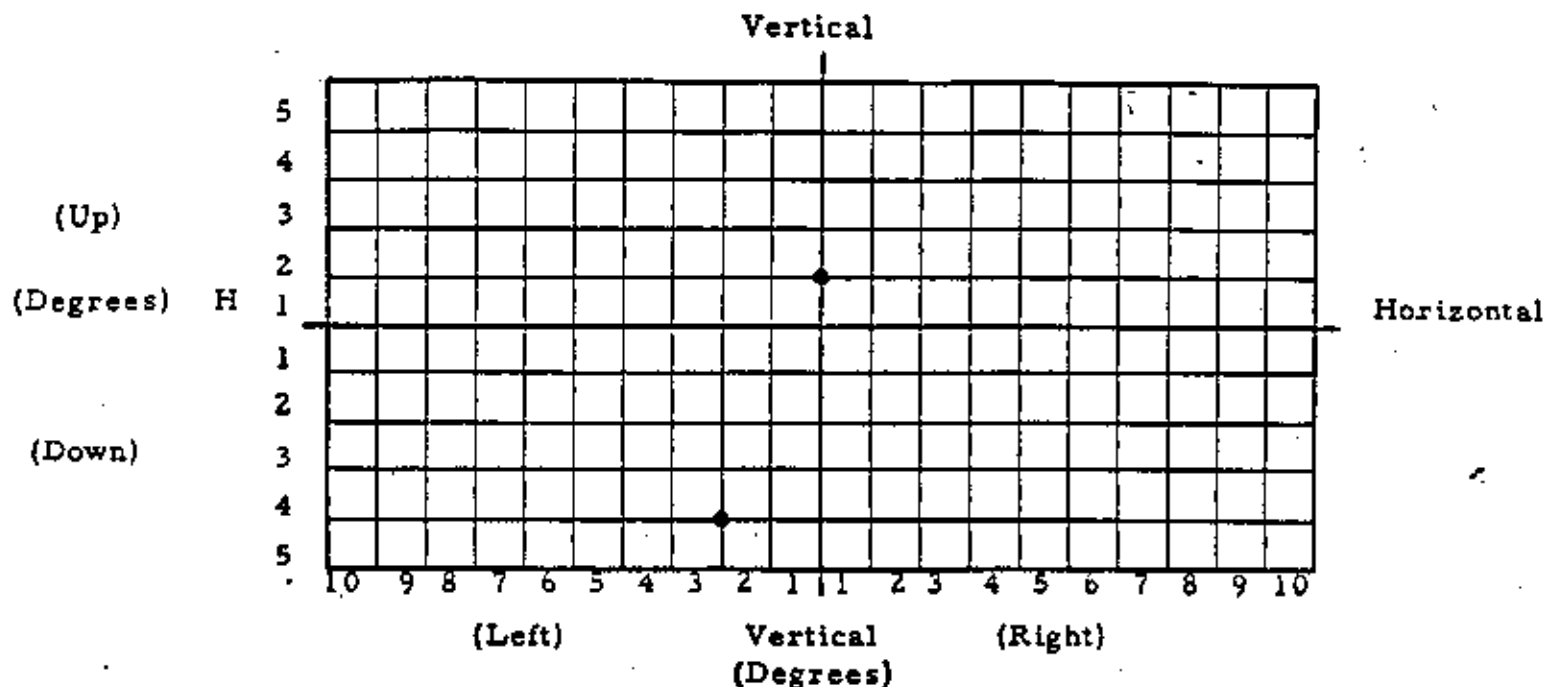
The photoelectric sensing element shall exhibit a minimum sensitivity of 0.003 footcandles. The element shall be color corrected by using a photopic filter such that the system will match the commission Internationale de l'Eclairage (CIE) photopic relative response curve from 500 to 700 nanometers within 2 percent of the value being measured.

Prior to each Photometric Test, the complete system shall be single point calibrated with the aid of a Standard Illuminant "A." The Standard Illuminant "A" shall be compared with two other standard bulbs prior to the photometric test. Any deviation of cp between the three lamps exceeding 2 percent shall be reason to recalibrate all standards.

### Equipment List

<u>Item</u>	<u>Range</u>	<u>Accuracy</u>
Goniometer	Vertical $\pm 4$ inches Horizontal $\pm 4$ inches Rotation $\pm 90$ degrees in vertical and horizontal	$\pm 0.1$ degrees
Photoelectric System	0.003 - 10 footcandles	$\pm 5$ percent of value being measured
Regulated Power Supply	0-20 volts DC	$\pm 1.0$ percent
Ammeter	0-20 Amps DC	$\pm 0.5$ percent
Steel Tape	0-100 feet	$\pm 1/8$ inch
Transit	Vertical $\pm 1$ inch	1/60 degree

## DEFINITION OF PHOTOMETRIC TEST POINTS



The line formed by the intersection of a vertical plane through the light source of the device and normal to a test screen is designated as "V". The line formed by the intersection of a horizontal plane through the light source and normal to the test screen is designated as "H". The point of intersection of these two lines is designated as "H-V".

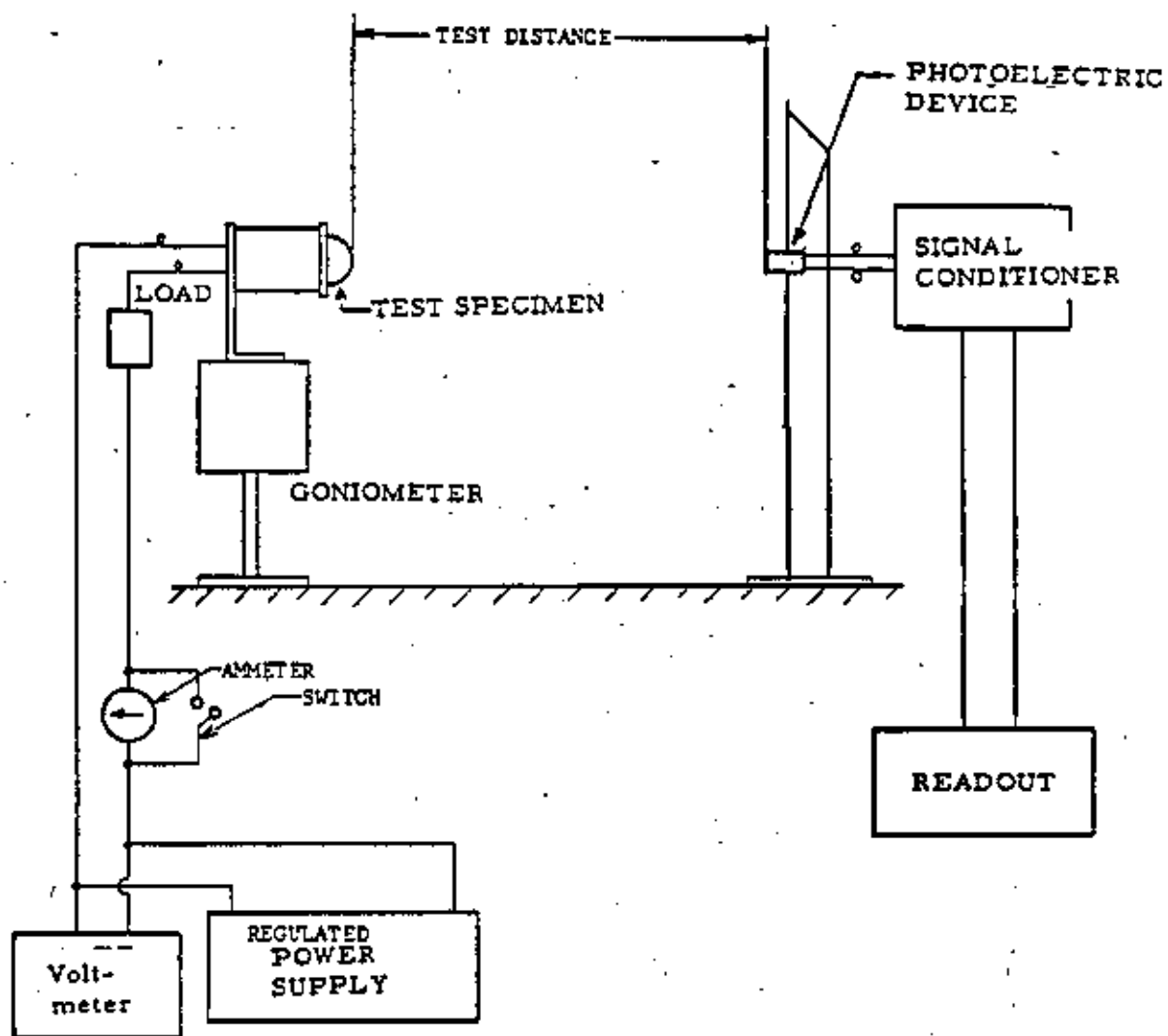
The other points on the test screen are measured in terms of degrees from the "H" and "V" lines. Degrees to the right ("R") and to the left ("L") are regarded as being to the right and left of the vertical line, "V", when the observer stands behind the lighting device and looks in the direction of the emanating light beam when the device is properly aimed for photometry with respect to the H-V point.

Similarly, the upward angles are designated as "U" and the downward angles are designated "D", referring to the light emanating at angles above and below the horizontal line, "H", respectively.

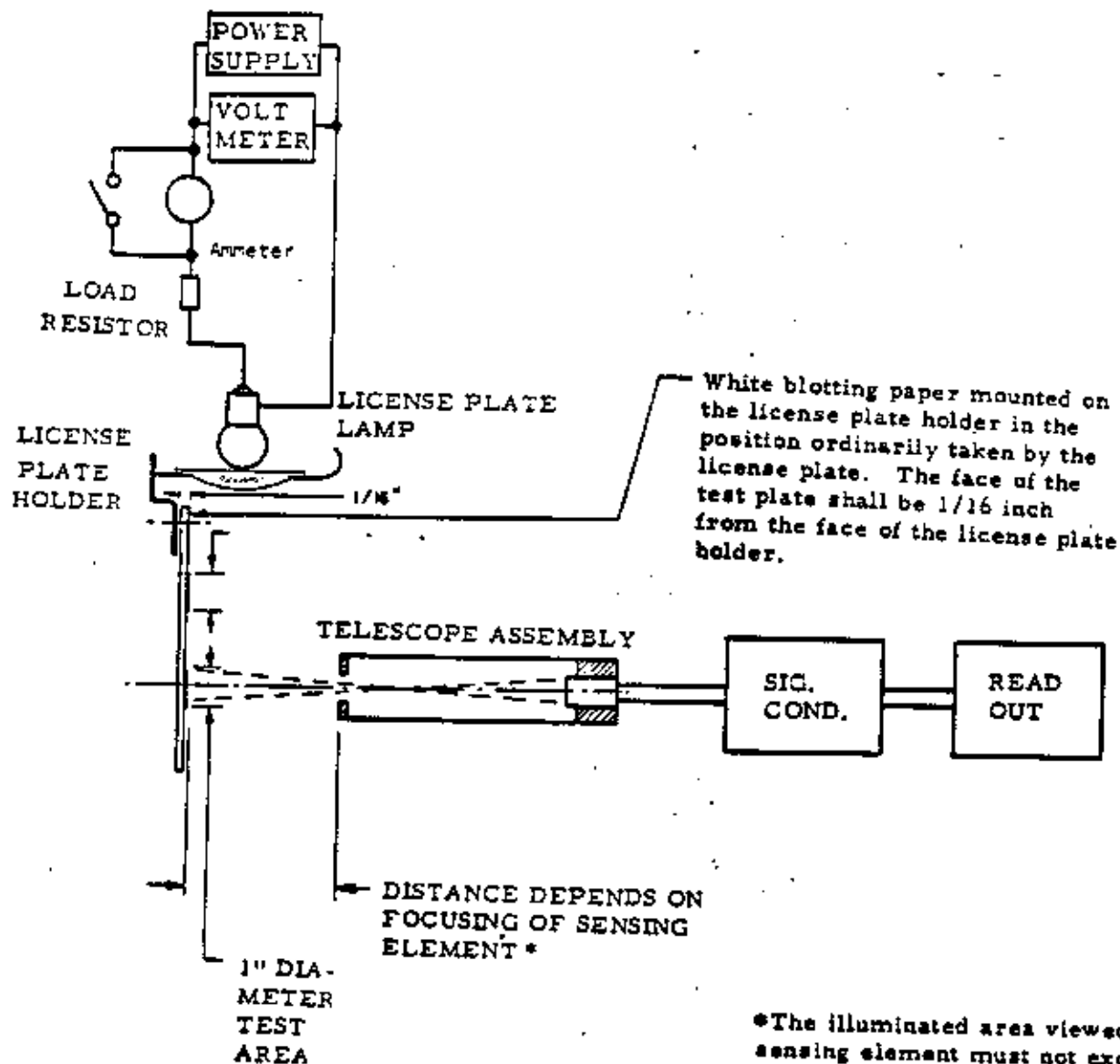
### EXAMPLE:

- (1) 4D-3L is a point 4 degrees below H and 3 degrees to the left of V.
- (2) 1U-V is a point 1 degree above H and on the line V.



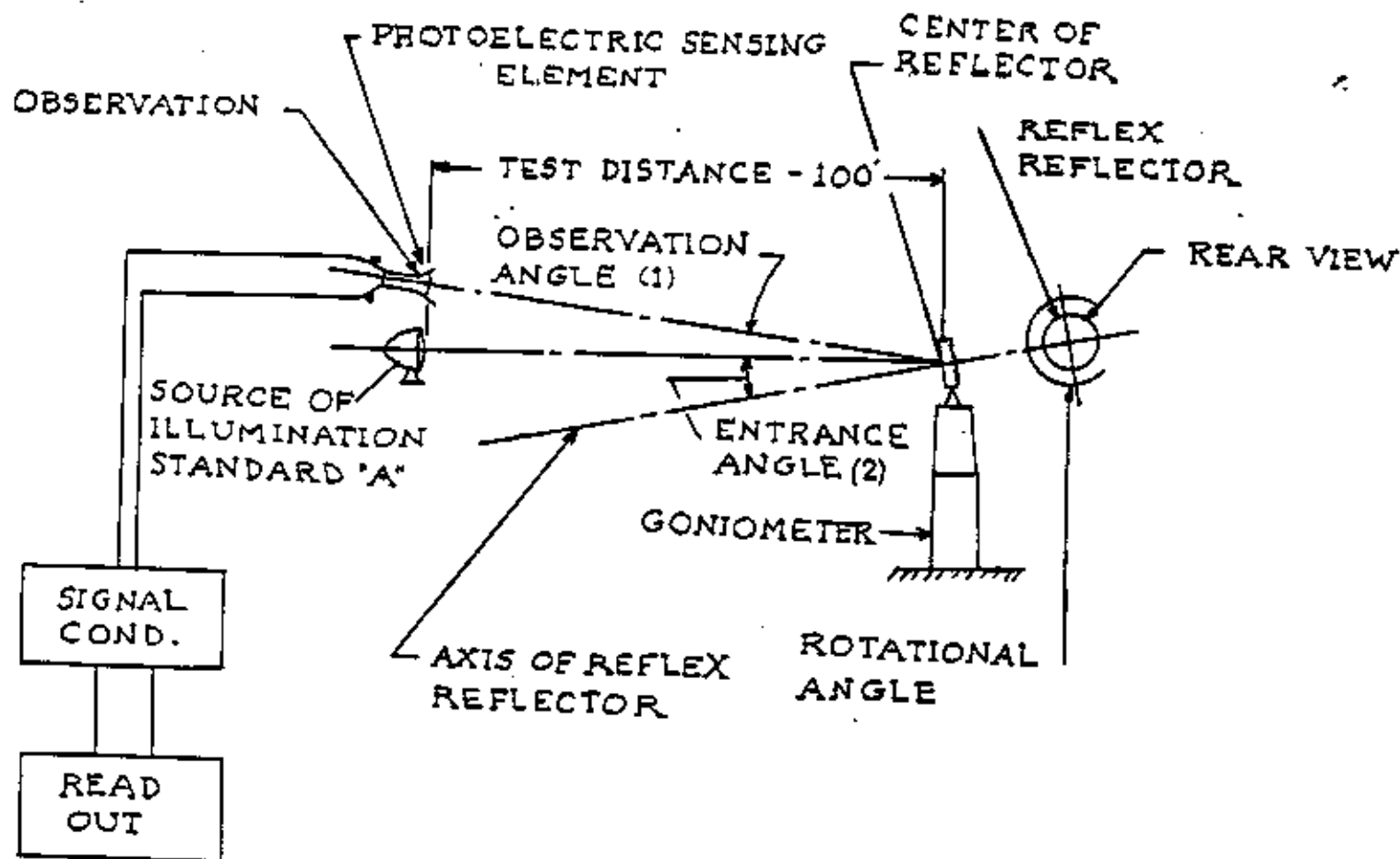


TYPICAL PHOTOMETRIC TEST SETUP  
FOR LIGHTING DEVICES



\*The illuminated area viewed by the sensing element must not exceed that area encompassed by a 1 inch diameter circle.

- (1) The observation angle is the angle formed by a line from the observation point to the center of the reflector and a second line from the center of the reflector to the source of illumination.
- (2) The entrance angle is the angle between the axis of the reflex reflector and a line from the center of the reflector to the source of illumination. The entrance angle shall be designated left, right, up and down in accordance with the position of the source of illumination with respect to the axis of the reflex reflector.
- (3) The photoelectric sensing element used in the reflex reflector photometric test shall not have an opening to the photocell more than  $\frac{1}{2}$  inch vertical by 1 inch horizontal.



REFLEX REFLECTOR PHOTOMETRIC TEST SETUP



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ATTACHMENT I

FINAL REPORT

COVER SHEET

PREPARATION OF STANDARDIZED OUTSIDE FRONT COVER  
SHEET AND TECHNICAL REPORT TITLE PAGE

FOR NHTSA STANDARDS ENFORCEMENT Compliance

TEST REPORTS

OUTSIDE FRONT COVER

A transparent front sheet and heavy paper back cover shall be provided for protection of the report. A self-cover (of the same paper as the test) including the information shown in Figure 1 is required for all reports. Group related items as follows:

Group I

1. Report Number. Each report shall carry a unique alphanumeric designation. NHTSA report will have the following numbering system:

Example: 105 - ABC - 82 - 001 - TR 10865

Coding: 108- FMVSS Tested

ABC - Initials of Laboratory Performing Test

82 - FY of Program (Assigned by CTM)

001 - Preassigned Test Number

TR 10865 - Test Laboratory's Internal Test  
Report Number

Group II

1. Title and Subtitle. Display the title prominently and make it indicate clearly and briefly the subject coverage of the report. Set subtitle in small type or otherwise subordinate it to the main title. NHTSA report titles shall appear in basically the following manner:

Lamps, Reflective Devices, and Associated Equipment,  
Office of Vehicle Safety Compliance Testing FMVSS No. 108 XYZ Motor  
of Vehicle Safety - 1982 Dolphin Sedan Sidemarker Lamps.

TP-108-10

TP-108-10

TP-108-08  
Tp-108-10



Report No. 108-ABC-82 001A-F-TR-10865  
Through  
108-ABC-82 002A-F-TR-10865

Title LAMPS. REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT - FMVSS NO. 108  
Subtitle REPLACEABLE BULB HEADLAMP

Manufactured by Ichikoh Industries, Ltd.

Installed in 1984 Nissan Sentra

Nissan Part No. 26061-40A00

Performing  
Organization  
name and address

ABC Laboratories, Inc.  
405 Main Street  
Zedburg, Tenn. 23700



Date FEBRUARY 1982

Type of Report FINAL REPORT

DOT  
Operating administration  
DOT  
headquarters  
and address

Prepared for-  
DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
400 Seventh Street, S. W.  
WASHINGTON, D.C. 20590



Prepared for the Department of Transportation, National Highway  
Traffic Safety Administration under Contract No.  
This document is disseminated under the sponsorship of the  
Department of Transportation in the interest of information  
exchange. The United States Government assumes no liability  
for its contents or use thereof.

Prepared by \_\_\_\_\_

Approved by \_\_\_\_\_  
Signature of Responsible Laboratory Official

Date \_\_\_\_\_

Report Accepted By:

\_\_\_\_\_  
Contract Technical Manager,  
Office of Vehicle Safety Compliance

Date \_\_\_\_\_

(Inside Front Cover)

Figure 1A

TP-108-10

TP-108-09

TP-108-08

TECHNICAL REPORT STANDARD TITLE PAGE			
1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle		5. Report Date	
		6. Performing Organization Code	
7. Author(s)		8. Performing Organization Report No.	
9. Performing Organization Name and Address		10. Work Unit No.	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address		13. Type of Report and Period Covered	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract			
17. Key Words		18. Distribution Statement	
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price

Form DOT F 1700.7 (9-69)

Figure 2A. Technical Report Standard Title Page. This page provides the data elements required by DoD Form DD-1473, HEW Form OE-6000 (ERIC), and similar forms.

Figure 2A

## HOW TO FILL OUT THE TECHNICAL REPORT STANDARD TITLE PAGE

Make items 1, 4, 5, 9, 12, and 13 agree with the corresponding information on the report cover. Use all capital letters for title (item 4). Leave items 2, 6, and 14 blank. Complete the remaining items as follows:

3. Recipient's Catalog No. Reserved for use by report recipients.
7. Author(s). Include corresponding information from the report cover. In addition, list the affiliation of an author if it differs from that of the performing organization.
8. Performing Organization Report No. Insert if performing organization wishes to assign this number.
10. Work Unit No. Use the number code from the applicable research and technology resume (for example, DoD Form 1498, FAA Form 1750.1, etc.) which uniquely identifies the work unit under which the work was authorized.
11. Insert the number of the contract or grant under which the report was prepared.
13. Supplementary Notes. Enter information not included elsewhere but useful, such as: Prepared in cooperation with... Translation of (of by)... Presented at conference of... To be published in...
16. Abstract. Include a brief (not to exceed 200 words) factual summary of the most significant information contained in the report. If possible, the abstract of a classified report should be unclassified. If the report contains a significant bibliography or literature survey, mention it here.
17. Key Words. Select terms or short phrases that identify the principal subjects covered in the report, and are sufficiently specific and precise to be used as index entries for cataloging. The sponsoring agency may specify that the key words shall conform to standard terminology, such as that given in the Department of Defense Thesaurus of Engineering and Scientific Terms or the Engineers Joint Council Thesaurus of Engineering Terms.
18. Distribution Statement. Enter one of the authorized statements used to denote releasability to the public or a limitation on dissemination for reasons other than security of defense information. Refer questions on the statements to the sponsoring agency.
19. Security Classification (of report). NOTE: Reports carrying a security classification will require additional markings giving security and downgrading information as specified by the sponsoring agency.
20. Security Classification (of this page). NOTE: Because this page may be used in preparing announcements, bibliographies, and data banks, it should be unclassified if possible. If a classification is required, identify the classified items on the page by an appropriate symbol.
21. No. of Pages. Insert the number of pages.
22. Price. Insert the price set by the Clearinghouse for Federal Scientific and Technical Information or the Government Printing Office, if known.

Figure 2B. Reverse side of Technical Report Standard Title Page. This side will not be included in published reports.

Figure 2B

